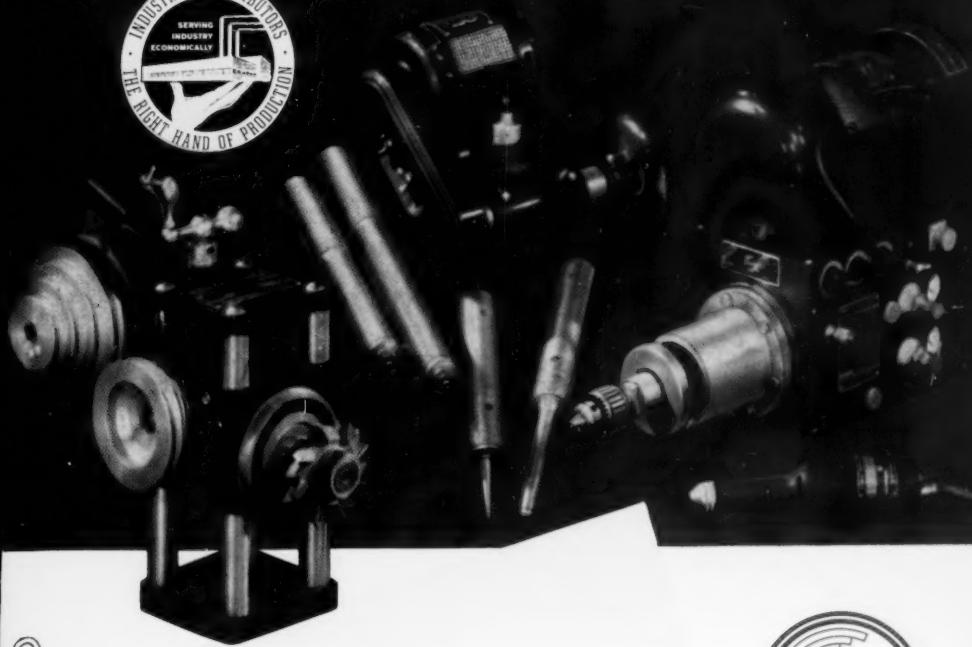


modern machine shop

MACHINING
MAGNETICALLY
HELD PARTS
See Page 118

HOW TRANSFER
PRESSES FORM
METAL STOCK
See Page 128

JULY 1959



MEMO:

You can save tooling and production dollars by contacting your local Dumore Industrial Supply Distributor. Ask him for the complete story about Dumore Precision Tools for efficient grinding, drilling, milling and other metalworking operations.



See Pages
12, 14 and 16



To rest assured,
wide awake men tool up with
ADAMAS CARBIDE.....

Producers of
Tungsten Carbide Tools,
Tool Tips,
Dies, Wear Parts
Dex-A-Tool



ADAMAS CARBIDE
CORPORATION

KENILWORTH, NEW JERSEY

For more data circle 302 on Postpaid Card

M. L. FORNEY, Publisher
 RICHARD S. KLINE, General Manager
 FRED W. VOGEL, Editor
 ROBERT I. SHORE, Managing Editor
 L. L. BALDHOFF, New Equipment Editor
 M. C. DUE, Editorial Assistant
 GILBERT C. CLOSE, Field Editor
 ALFRED M. COOPER, Contributing Editor
 NORMAN S. ROGERS, Art Editor
 HOWARD CAMPBELL, Editor Emeritus

contents

modern machine shop

Published in the
Machine Tool Capital
of the World

Vol. 32, No. 2, July, 1959

FEATURES IN THIS ISSUE

Quality Control	THE FORWARD LOOK—RX FOR SPACE AGE OBSOLESCENCE	100
Plant Layout	By Gilbert C. Close	
Fixtures	THE FACTS OF LIGHT	108
Management	By Ralph O. Smith	
Drawing	MAGNETIC HOLDING FIXTURES ON MACHINE TOOLS	118
Tool Design	By Frank L. Suchanek	
Drilling	HOW TO SOLVE YOUR SUPERVISORY PROBLEMS	126
Carbide Tooling	By Alfred M. Cooper	
Automation	THE MODERN TRANSFER PRESS	128
Dust Control	By Ernest J. Urbas	
Die Design	SPECIAL CHAMFER GRIND SOLVES TAPPING PROBLEM	140
Jigs	DRILLING MACHINE SAVES HANDWHEEL PRODUCTION TIME	142
Safety Methods	MILLING CUTTER CHANGE CUTS TOOL COSTS	144
	CYLINDER SLEEVES HONED AUTOMATICALLY	146
	SYSTEM PROVIDES FOR EFFECTIVE DUST COLLECTION	151
	HEX NUTS MAKE USEFUL RETREADING DIES	154
	By H. J. Gerber	
	NON-MARRING SHAFT COLLAR	154
	By F. Murray	
	SIMPLE AIR CHECK VALVE	155
	By Roger Issets	

DEPARTMENTS

IMPORTANT MEETING DATES	56	NEWS OF THE INDUSTRY	158
ADVERTISING REPRESENTATIVES	93	FREE LITERATURE	176
OVER THE EDITOR'S DESK	94	NEW SHOP EQUIPMENT	188
PRODUCTION THRU MODERNIZATION	142	WHERE TO GET IT	270
IDEAS FROM READERS	154	INDEX TO ADVERTISEMENTS	278



Member

EPA

A Statement of Policy

The principal function of MODERN MACHINE SHOP is to search out and disseminate the best and newest ideas for the advancement of engineering skill and mechanical efficiency in the metalworking industry, and neither effort nor expense is, or shall be, spared in the performance of this task.

modern machine shop

features in

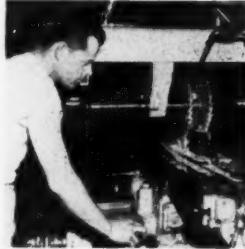
Assembling & Finishing...Inspecting, Testing & Control...
Press Working...Management & Safe Practices...Materials
& Processes...Production Machining...Tooling & Design

THE FORWARD LOOK— RX FOR SPACE AGE OBSOLESCENCE

By **Gilbert C. Close**

The production of ballistically-actuated store ejector units (for the controlled dropping of supplies from the air by aircraft) at the Bohanan Manufacturing Company, Compton, California, is a good example of how "the forward look" must be employed in modern, progressive shop organizations, rather than reliance on past experience.

Page 100



THE FACTS OF LIGHT

By **Ralph O. Smith**

In simple easy-to-understand terms, the author discusses the subject of lighting as it applies to the modern metalworking plant. Interesting illustrations showing the advantages of correct plant lighting are included with the text.

Page 108

MAGNETIC HOLDING FIXTURES ON MACHINE TOOLS

By **Frank L. Suchanek**

This article is comprised of a number of case histories describing in detail how magnetic clamping is saving operator time and effort on a variety of production machining jobs.

Page 118

this issue

JULY 1959 • VOL. 32 • NO. 2

HOW TO SOLVE YOUR SUPERVISORY PROBLEMS

By Alfred M. Cooper

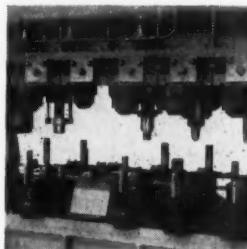
Detailed answers are presented to questions pertaining to the function of the supervisor in dealing with labor relations problems; also to the question of soft supervision and whether it can improve worker morale and industrial relations.

Page 126

THE MODERN TRANSFER PRESS

By Ernest J. Urbas

This is the first installment of a two-part comprehensive discussion on the operation and use of the modern transfer press. Author Urbas draws on his wide experience in tool and die work to present interesting data on this so-called special type of punch press into which a series of individual press dies are mounted that produce the workpiece from raw material to finished product.



Page 128

SPECIAL CHAMFER GRIND SOLVES TAPPING PROBLEM

By Ralph B. Petersen

The author explains how a "bottleneck" in producing gear transmission housings was broken by means of a simple tap alteration.

Page 140

modern machine shop

*there is a
threading
specialist*

**IN
YOUR
SHOP**



He is your Landis Service Representative. Although not in your plant every minute of every day, a phone call or wire will bring him to you promptly. Downtime, improper chaser life, failure to meet specifications . . . these are the types of problems your Landis Service Man helps you to avoid. By working with our Engineering Department they are able to provide additional information for your special Threading requirements. All LANDIS equipment is guaranteed to produce threads to meet the degree of accuracy and production for which it is sold. Our extensive staff of Service Men (located throughout the country), plus the above guarantee, emphasize the value LANDIS assigns to satisfied customers . . . whether your operation is by rolling, cutting, grinding, or tapping. We sell performance, not just products, and you become an expert on threading when our experienced Service Representatives are at your service.

LANDIS Machine COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.

For more data circle 317 on Postpaid Card

Dust

**TRAP THIS DANGEROUS
ENEMY with**

Hammond
DUSKOLECTORS

Dust is a serious problem in most industrial plants. With Hammond DUSKOLECTORS you trap this dangerous enemy at its source before it can harm the health and efficiency of your employees and damage valuable machinery. Your cleaning and painting costs will also be reduced. Hammond DUSKOLECTORS offer you the best and most economical solution to your dust problems. Write today for catalog with helpful engineering information and interesting installation views.



"A MUST FOR DUST!"



Hammond Machinery Builders
INC.
1615 DOUGLAS AVE. • KALAMAZOO, MICHIGAN
For more data circle 318 on Postpaid Card

94 ELECTRIC CLUTCH HAND TURRET LATHE

- **MORE PRODUCTION**
- **MORE ACCURATE WORK**
- **FINER FINISH AND**
- **LOWER COST**



FREE
descriptive catalog

THE WADE TOOL CO.

75 RIVER STREET

WALTHAM 54

For more data circle 319 on Postpaid Card

MASS.

NEW from GRAND RAPIDS

*and just look at all
these features:*

- Powered vertical movement of wheel head*
- Instantly variable hydraulic table speed
- Greased-for-life precision ball bearing spindle with two speeds for long wheel life
- Head carried on protected pre-loaded ball bearing ways
- Equipped with Vickers vane type pump and our own control valve for infinite longitudinal table speeds from 5" to 120' per minute
- Variable speeds hydraulic cross feed and continuous cross feed
- Rugged, one-piece casting column and base for permanent rigid alignment
- Ultimate in accuracy with micro inch finish at production speeds

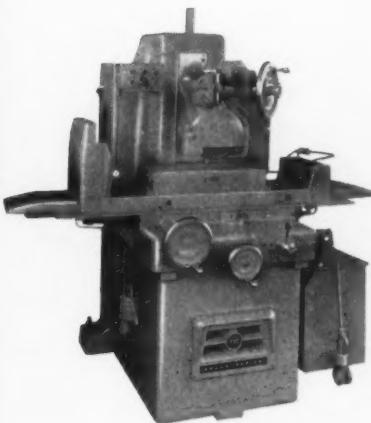
*Automatic downfeed available as optional feature



For full details, just
send a note on your
letterhead.

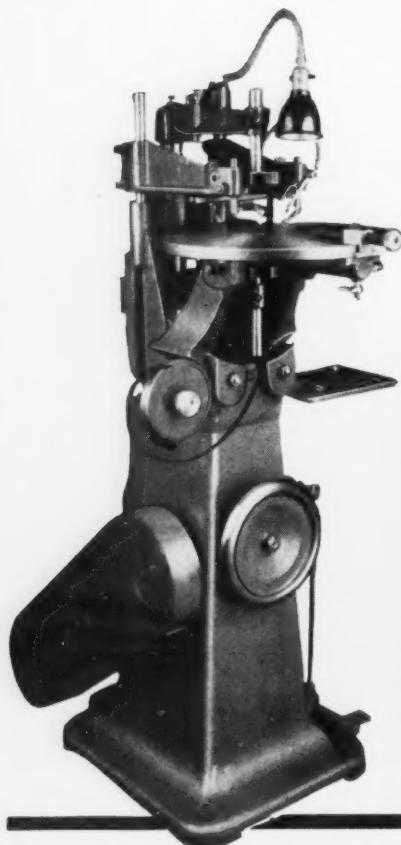
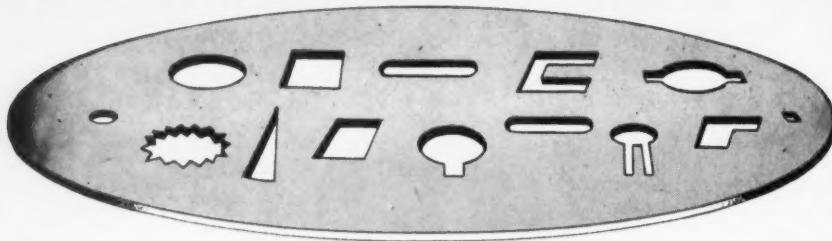
GALLMEYER & LIVINGSTON CO.
408 Straight Ave., S.W., Grand Rapids, Mich.

No. 350 PRECISION
TOOL ROOM TYPE
HYDRAULIC FEED
SURFACE GRINDER



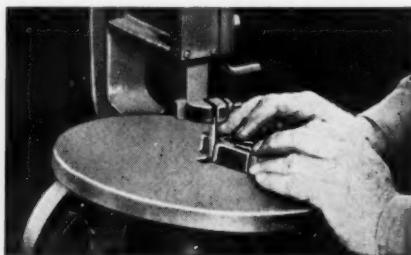
**GALLMEYER
& LIVINGSTON**

FOR CONTOURS LIKE THESE . . .



Freak contours — more conventional shapes — internal or external forms. In any case, you'll save valuable time by producing the job on an Oliver of Adrian contour sawing and filing machine.

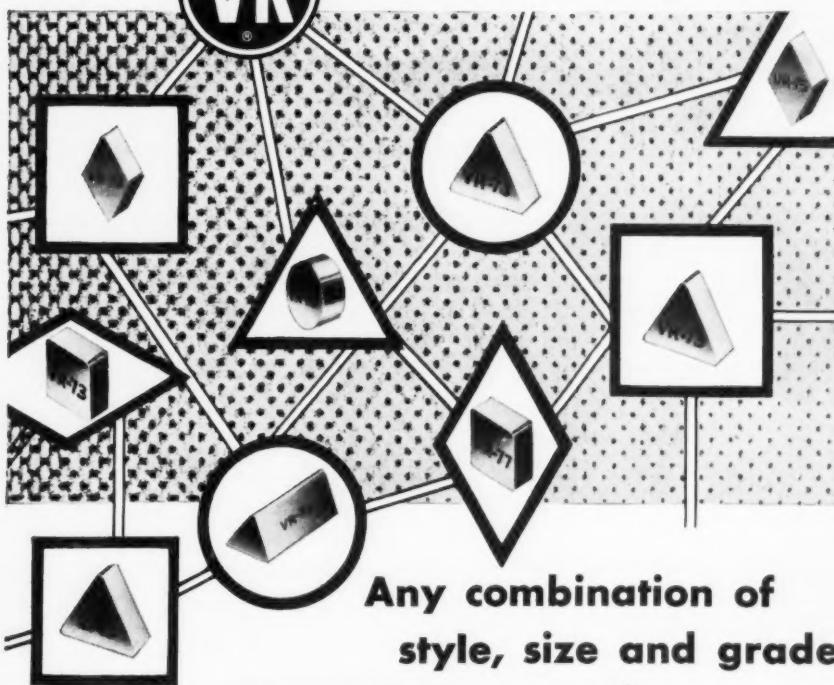
Parts for jigs and fixtures, dies, gages, templates and special machine production can be shaped to dimension faster — easier — at less cost. No hand filing or semi-finishing operations. Better investigate Oliver today. Just write. Available in five sizes — bench or pedestal.



OLIVER of ADRIAN
OLIVER INSTRUMENT COMPANY
1430 E. Maumee St. • Adrian, Michigan



carbide inserts...



**Any combination of
style, size and grade
to meet your needs**

Complete machining flexibility is possible only when you can get exactly the right combination of carbide insert grade, size and style . . . when you need it. That's why V-R manufactures the *most complete line* of inserts available anywhere. Regardless of the operation to be performed or the type of material to be machined, there's a V-R carbide insert that's best for your job. Ask your V-R representative.

He will be glad to show you how V-R's complete line can provide fast answers to your cutting tool problems.



Send for Catalog
VR-58 for
complete details.



Vascoloy-Ramet corporation

PRIME MANUFACTURERS OF REFRactory METALS ENGINEERED FOR THE JOB

C-743-S

844 Market Street • Waukegan, Illinois

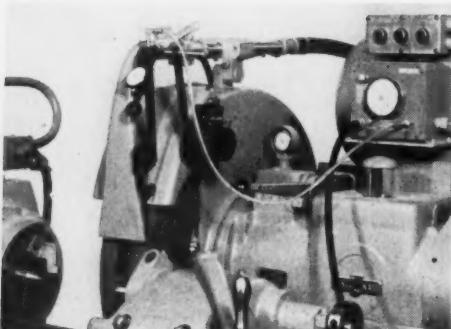
For more data circle 320 on Postpaid Card

July, 1959

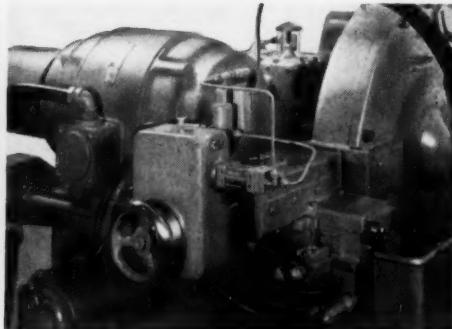
modern machine shop 9



* These standard attachments increase
grinding machine Accuracy
... Production
... Versatility



*Automatic Air-Electric Gage Sizing ensures constant cycle time, and repetitive accuracy within minimum tolerances. Reduces operator responsibility, maintains high production rate.

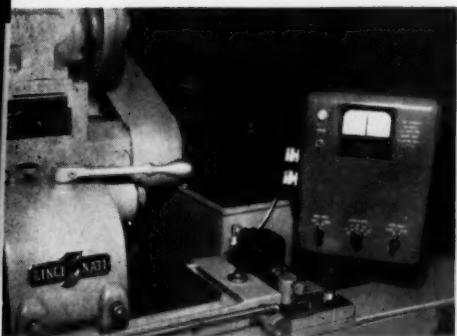


*Automatic Behind-the-Wheel Profile Truing. For rapid, accurate truing of grinding wheel to correct profile. Increases wheel life, effects major savings in production costs.

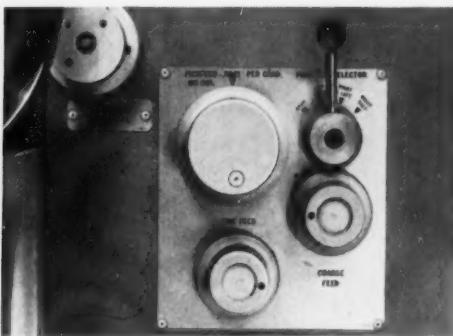
PRECISION GRINDING MACHINES: CENTERTYPE • CENTERLESS • MICRO-CENTRIC • ROLL

Use of the proper Cincinnati Attachments can help you earn greater profits from your Cincinnati Grinding Machine investment. By more precise control of accuracy they end guesswork, save operator's time, speed production. These expertly designed attachments are available in a wide variety to perform scores of toolroom and production operations, making your Cincinnati Grinding Machines more versatile and reducing idle machine time.

Every shop has work that can be handled profitably on Cincinnati Grinders equipped with the appropriate attachments. Several examples are illustrated below, and many more are described in catalog G-701. May we send you a copy? **Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



***Gage Line.** An electronic taper correcting unit which replaces trial and error with amazing sureness and accuracy. Saves valuable production time, reduces costs.



***Automatic Dual Rate Infeed.** Automatically provides rapid stock removal at start of cycle, then a slow feed for accuracy in sizing and surface finishing.



• CHUCKING • CENTERLESS LAPING

For more data circle 321 on Postpaid Card

July, 1959

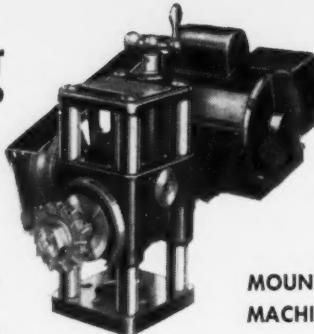
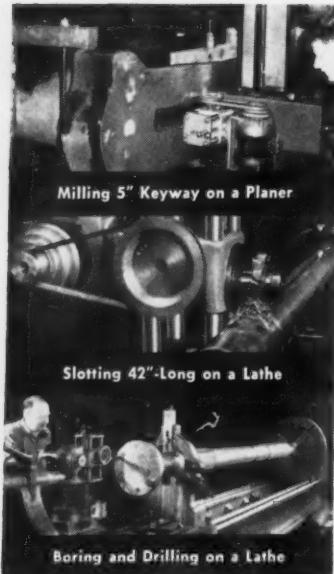
modern machine shop 11

**save machining
costs with this
versatile new tool**

DUMORE[®] VERSA-MIL[®]

MILLS • BORES • SHAPES
SLOTS • GRINDS • DRILLS

...anywhere!



**MOUNTS ON ANY
MACHINE TOOL**

• Compact, rigid, lightweight, portable, this *new* machine efficiently performs in any position, as an independent unit with its own power and feeds, or added to machine tools —lathes, planers, shapers, millers, grinders. Saves handling, moving, set-up and down time.

Gives close tolerance, quality results while removing metal at *profitable* rates. Adapts quickly to standard machines, fixed machinery in place, pieces in fixtured set-ups, or on parts too big for standard machines. By taking Dumore Versa-Mil to the work, it gives you the advantage of machining where it is most economical!

SOLD AND SERVICED THRU LEADING
INDUSTRIAL DISTRIBUTORS EVERYWHERE

You Can Do More with



All-Purpose Precision
Metalworking Tools

Versa-Mil • Drill-N-Tap Units • Drilling Units • Drill Heads
Micro-Drills • Drill Grinders • Precision Grinders • Hand
Grinders • Flex-Shaft Tools • Quills and Accessories

GET THE FACTS . . . SEND COUPON

THE DUMORE COMPANY
1302-A Seventeenth Street, Racine, Wis.
Send Versa-Mil details

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

For more data circle 322 on Postpaid Card

Quality . . . the best economy of all



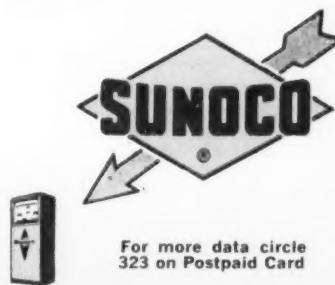
He does a better job when he can see what he's doing

You increase operator efficiency as well as production when you use transparent, heavy-duty Sunicut cutting oils. Operators work better, because Sunicut oils let them see tools and workpieces, see the finish, see micrometer graduations.

Sunicut oils don't stain hands and clothing. They pump easily, wet metal fast, and give excellent extreme-pressure lubrication.

To prove to yourself the economy of Sun quality, ask your Sun representative to help you select the right

grade of Sunicut for your heavy-duty cutting requirements. Or write to SUN OIL COMPANY, Dept. MM-7, Philadelphia 3, Pa. In Canada: Sun Oil Company Limited, Toronto and Montreal.



For more data circle
323 on Postpaid Card

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

Get Low Cost Automatic Drilling and Tapping

with
these
versatile

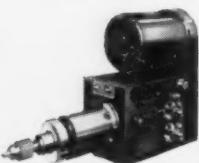
DUMORE[®] UNITS

do all these operations—and more
TAP • DRILL • REAM • CHAMFER
SPOT-FACE • CENTER • DEBURR



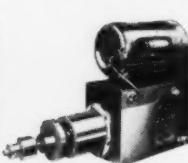
SERIES 28

Drills or taps at the flip of a selection switch. Tap fits into chuck, no extra attachments required. Reversing motor controls tap. Spindle speeds from 265 to 4900 rpm. For long or short runs.



SERIES 24

Fully automatic with all controls built-in for long or short runs and frequent changeovers.



SERIES 26

Identical in size and capacity to Series 24 with just basic controls built-in for long, uninterrupted runs.



NOSE MOUNTING BRACKET

YOUR KEY to all-purpose machining — anywhere.



SERIES 20

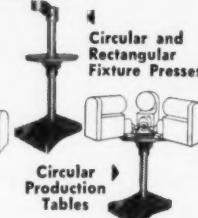
For high production drilling of small parts. Automatic built-in controls. No. 80 to 5/32" drill capacity.

...and these building-block accessories...

...let you use any Dumore Drill Unit where you can make the most of its versatile capacity. On drill press columns for single or multiple spindle applications; or added to single or multi-purpose production set-ups, transfer machines and other automatic systems.



COMPLETE DRILL PRESSES



Circular and
Rectangular
Fixture Presses



Cross
Arm Bar
Assemblies



Circular
Production
Tables

BRACKETS, all sizes for drill press mounting

Sold and Serviced Thru Leading Industrial Distributors Everywhere

You Can Do More with



All-Purpose
Precision
Metalworking
Tools

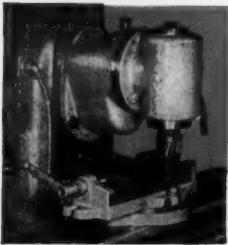
VERSA-MIL • DRILL-N-TAP UNITS • DRILLING UNITS • DRILL HEADS • MICRO-DRILLS • DRILL GRINDERS • TOOL POST AND HAND GRINDERS • FLEX-SHAFT TOOLS • QUILLS AND ACCESSORIES

THE DUMORE COMPANY

For more data circle 324 on Postpaid Card



Heavy Duty Vertical
Milling Attachment



Heavy Duty Offset
Vertical Milling Attachment



Universal Milling Attachment



Toolmakers Overarm

Send coupon for
FREE Comparison
Chart and detailed
descriptive literature
on easy-to-use
attachments.

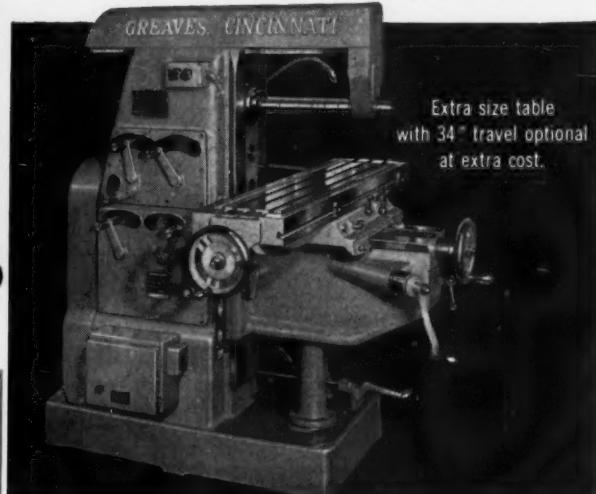
**Heavy duty attachments
increase versatility
of dependable, low-cost**

GREAVES MILLS

"THE MOST MILL FOR THE LEAST MONEY"

A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS.

Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.



GREAVES MACHINE TOOL CO.

2700 Eastern Avenue, Cincinnati 2, Ohio

Send Comparison Chart, I will make my own comparison of GREAVES MILLS with other makes.

Send information on Attachments and Accessories for GREAVES MILLS.

NAME _____

TITLE _____

FIRM _____

ADDRESS _____

ZONE STATE _____

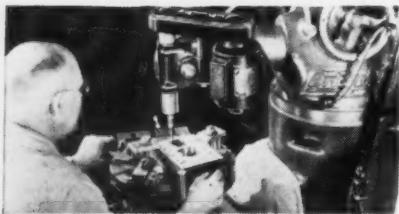
CITY _____

For more data circle 325 on Postpaid Card

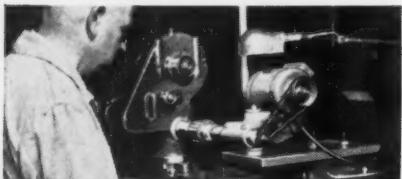
Want low cost precision grinding?

Just add a **DUMORE** GRINDER

to your planers, shapers,
millers, and lathes



MOUNTED ON MILLER, it provides a high speed precision grinding head for use with small mounted wheels, points or carbide burrs.



MOUNTED ON GRINDER, it finishes the I.D. of a Jacobs chuck on production.



MOUNTED ON PLANER, it provides a low cost surface grinder. Size of work is only limited by planer size.



SERIES 5

Highly versatile. Does hundreds of grinding jobs internal or external.

With only the small tool investment in a Dumore Precision Grinder you can get that production, tool room or maintenance grinding operation done—right on your own basic machine tools!

Quick, easy mounting gets it on and off your machine tools fast. It converts lathes to cylindrical grinders...shapers, planers, millers to surface grinders...standard grinders to high-speed internal grinders. Dumore Grinders have precision-built quills designed to give close tolerance performance at speeds from 4600 to 42,500 RPM. Nine models, from $\frac{1}{16}$ to 3 hp, swing $\frac{1}{8}$ " to 12" diameter wheels. Interchangeable pulley settings provide correct surface speeds for efficient grinding in all wheel sizes.

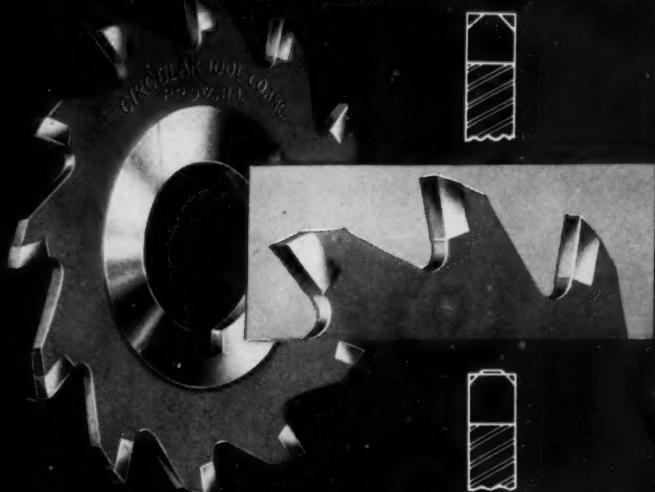
**Sold and Serviced thru
Leading Industrial Distributors Everywhere**

You Can Do More with
DUMORE All-Purpose Precision Metalworking Tools

VERSA-MIL • DRILL-N-TAP UNITS • DRILLING UNITS • DRILL HEADS • MICRO-DRILLS • DRILL GRINDERS • PRECISION GRINDERS • HAND GRINDERS • FLEX-SHAFT TOOLS • QUILLS AND ACCESSORIES

THE DUMORE COMPANY • 1302 Seventeenth Street, Racine, Wisconsin
For more data circle 326 on Postpaid Card

Carbide Tipped Saws . . .



**CIRCLE R Heat-treated
To Better Your Production**

CIRCLE R Carbide and Carbide Tipped Saws increase production manifold on tough jobs — and keep up the pace because they retain their tips, due to superior tipping-in. And exclusive Circle R Heat Treating perfects them for your purposes. Ask your Circle R Specialist.

Consult these CIRCLE R Specialists . . .

BURGARD
Production Metal Sales Inc.

CHICAGO
Donald Robertson & Co.

CLEVELAND
Precision Tool Co.

DAYTON
J. E. Kuntz Company

Detroit
R. D. Spruce

HACKENBACK
The Eaton Company

INDIANAPOLIS
Walter F. Green & Assoc.

MILWAUKEE
Fond du Lac

MONTREAL
Humphrey R. Walton

NEW YORK CITY
J. B. Crombie (Export)

PHILADELPHIA
General Tool Sales Co.

PHOENIX
D. L. Evans Tool Center

PITTSBURGH
Ralph Esposito & Company

PROVIDENCE
First Machine Co.

ROCHESTER
James O. Herre

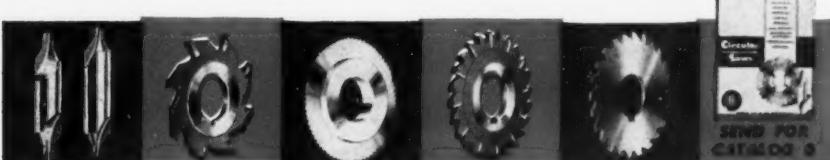
ST. LOUIS
R. W. Schaefer & Co.

WESTBURY, L. I.
The Eaton Company

CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND

Specialists in Circular Cutting Tools Since 1923



METAL SLITTING SAWS • COPPER SLITTING SAWS • SCREW SLOTTING SAWS • COMMUTATOR SLOTTING SAWS • JEWELERS' SLOTTING SAWS • CUT OFF SAWS • CIRCULAR KNIVES & ROTARY SHEAR BLADES • CIRCOLY STEEL SAWS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS • COMBINED DRILLS & COUNTERSINKS • CENTER BEAMERS

For more data circle 327 on Postpaid Card



DORMAC • MILL-MATIC

DIAL TYPE • HIGH SPEED

1200 rpm Universal Milling Machines

ACCURATE • DURABLE • EASY TO OPERATE

National standard taper Power feed in all directions. Hardened and ground gears. Power rapid traverse.

MILL-MATIC 48" x 11" Table

DORMAC 60" x 12" Table

Standard equipment included.

WOTAN

HIGH PRECISION

3 3/8" BORING MILL

for Toolroom and Production

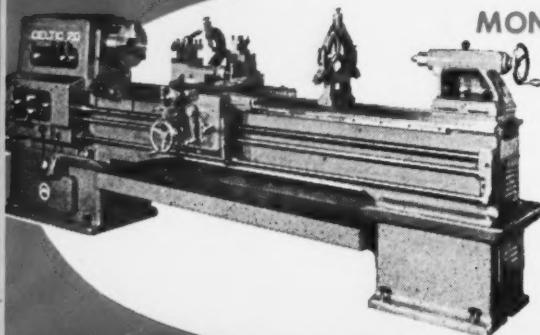
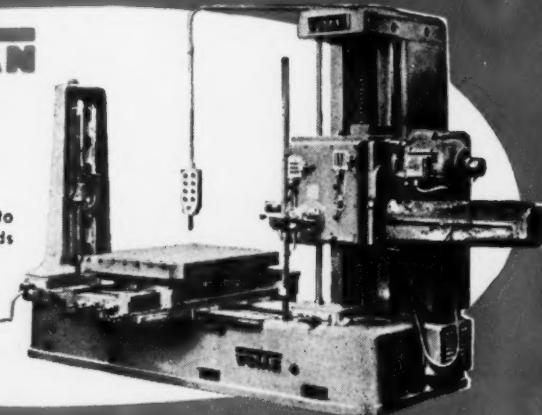
CAPACITY:

Vertical Capacity 36", Distance Spindle to Outboard Support 86", M.T. #5, Speeds up to 1000 RPM.

OTHER SIZES ARE BUILT IN:

4 1/8" and 5 1/8"

Table & Floor Type Models



MONDIALE CELTIC

PRECISION LATHES

CELTIC 20" LATHE

MADE IN 12"-14"-17"-20" SWINGS

QUALITY • PRECISION
DEPENDABILITY

DEALER INQUIRIES INVITED

WRITE FOR ILLUSTRATED BROCHURE

INDEX INDUSTRIAL CORPORATION

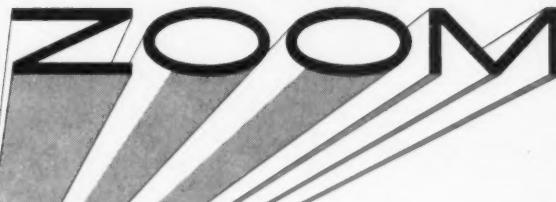
MM 150 BROADWAY • NEW YORK 38, N. Y. • BEECKMAN 3-4540

NEW!

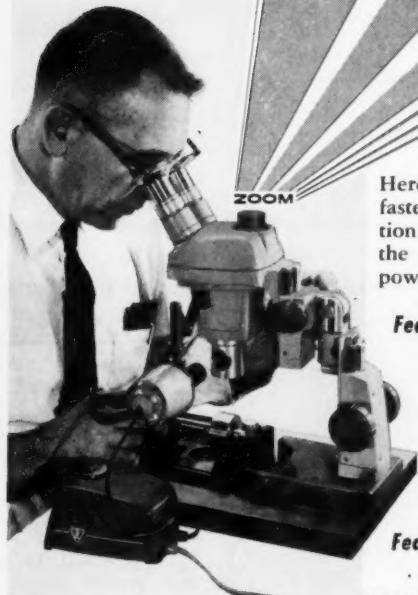
BAUSCH & LOMB STEREOMICROSCOPES

FEATURING

STEREO



CONTINUOUSLY
VARIABLE POWER



Here's a completely new optical concept for faster, easier 3D work. Just turn the magnification knob and watch the stereo image zoom to the *exact* size you need. Not just a few fixed powers, but *any* power within the wide range!

Featuring Exclusive POWER POD Design Concept

- Sealed to keep dust out of optical system!
- No nosepiece!
- No objectives to change!
- No image jump!
- No image blackout!



Featuring NEW LOW PRICE

... about one-third lower than previous line!

MAIL COUPON TODAY!

BAUSCH & LOMB



America's only complete optical source
... from glass to finished product

BAUSCH & LOMB OPTICAL CO.
89343 St. Paul Street, Rochester 2, N. Y.

Send me new Catalog D-15.
 Schedule a demonstration at my convenience.

Name, Title.....

Company.....

Address.....

City..... Zone..... State.....

For more data circle 329 on Postpaid Card

July, 1959

modern machine shop 19

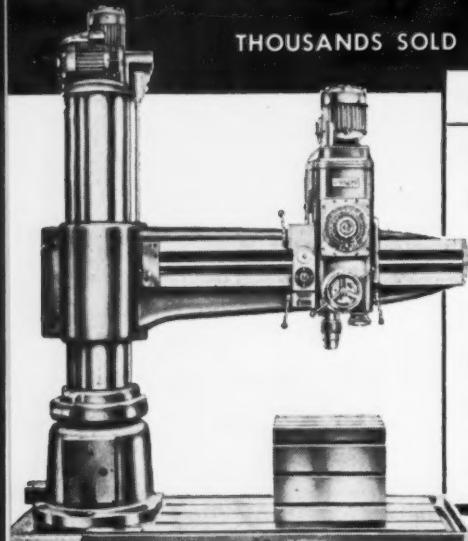
circle 328 on Postpaid Card

For more data on advertisement on opposite page.

UNBELIEVABLE VALUES!...

IMPERIAL RADIAL DRILLS

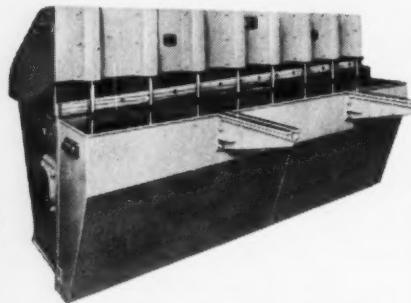
THOUSANDS SOLD TO SATISFIED CUSTOMERS!



Model	Col. Diam. Inches	Arm	Base Price
L-26	7 1/2	26"	\$1995.
L-2 1/2	8 1/2	2 1/2'	\$2085.
L-3	8 1/4	3'	\$2195.
M-3PE	10	3'	\$3995.
M-4PE	12 5/8	4'	\$4985.
M-5PE	14	5'	\$6295.
M-6PE	14	6'	\$6985.

AGENTS WANTED

IMPERIAL
WIEGER
Guillotine
Shears



- ALL STEEL CONSTRUCTION
- SINGLE STROKE CONTROL
- PERMANENT ACCURACY

8" gaps on all models. Cuts thin and heavy gauge accurately.

Length	Capacity	Price
6'	10 gauge	\$3595.
8'	12 gauge	\$4395.
10'	12 gauge	\$5195.
6'	3/16 inch	\$5190.
8'	10 gauge	\$5495.
10'	10 gauge	\$5795.
6'	7/32 inch	\$6190.
8'	3/16 inch	\$6495.
10'	3/16 inch	\$6795.

AARON MACHINERY CO., Inc.

DEPT. M 45 CROSBY ST., N. Y. 12 • WA 5-8300

For more data circle 330 on Postpaid Card

BRANCHES AT:
BUFFALO, N. Y. RICHMOND, CAL.
MINEOLA, N. Y. LOS ANGELES, CAL.
HOUSTON, TEXAS

SEE OTHER AD ON PAGE 29



*Get this
valuable report on*

The best ways to finish metal stampings

from your Norton Representative

Newest in the Norton series of reports to industry is *Barrel-Finishing of Metal Stampings*, prepared by Norton Abrasive Engineers.

Based on continual observation of finishing techniques in many plants, this report brings you plenty of worthwhile information on the advantages of barrel-finishing equipment and abrasives. Included are facts on types and sizes of stampings you can barrel-finish . . . and reports like the following.

Aircraft panel stampings, 12" square x $\frac{1}{8}$ " thick, perforated, were processed by placing 12 panels 1" apart, using steel rods with fiber bushings as spacers. This whole unit was placed in the barrel, where bonded, triangular-shaped ALUNDUM TUMBLEX* "T" chips successfully removed all burrs from the stampings' edges and perforations.*

Making better products . . . to make your products better
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electro-Chemicals

BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

For more data circle 331 on Postpaid Card

July, 1959

modern machine shop 21

Your Norton Representative can supply you with this report fast — will also provide literature on all TUMBLEX abrasive types: "A" (random-shaped chips), "T" (bonded triangles), "S" (bonded spheres), and "N" (natural stones), covering the widest range of finishing requirements. And samples of your work parts sent to our Sample Processing Department will be promptly barrel-finished and returned to you with complete facts as to abrasives, methods and equipment. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

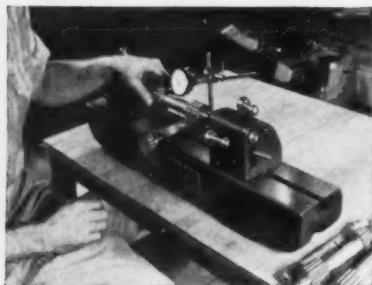
*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries



G-372

Save time, improve checking accuracy with these Sundstrand accessories

A wide range of sizes in the most modern checking accessories available—that's what you get from Sundstrand. Industry wide acceptance of these Sundstrand accessories is your guarantee of outstanding performance.



6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

Check runout within .0001" limits

on gears, sprockets, pinions, etc. on this modern Sundstrand bench center insuring simpler assembly and higher production. Because of Sundstrand's "one-hand control" over-all movable elements, the other hand is left free to control rotation of the part. Complete table of sizes available is at left.

Quick, precise balancing of grinding wheels, pulleys, flywheels, etc., in a choice of nine sizes of balancing tools is offered by Sundstrand. These sensitive, durable tools are portable (except for No. 5 extra-heavy duty) and can be placed where needed without leveling. Capacities range from 12 to 24,000 lb., 21" to any swing desired, and from 20" to any length desired between standards.



*For complete specifications on these accessories,
write for Bulletin A-555.*



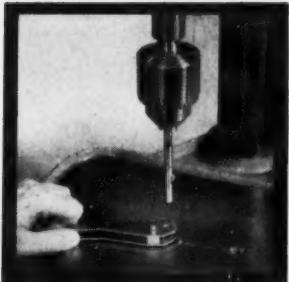
SUNDSTRAND-AMERICAN BROACH

DIVISION OF SUNDSTRAND CORPORATION

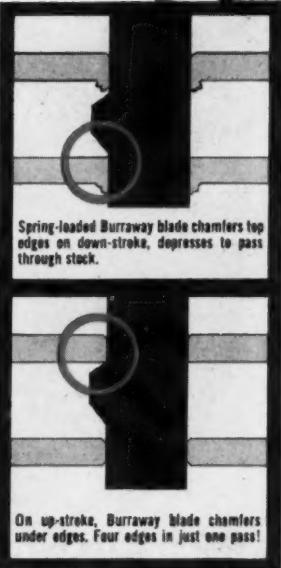
ANN ARBOR, MICHIGAN

For more data circle 332 on Postpaid Card





DEBURRING COSTS CUT 2/3 ON THIS PART!



Spring-loaded Buraway blade chamfers top edges on down-stroke, depresses to pass through stock.



On up-stroke, Buraway blade chamfers under edges. Four edges in just one pass!

One pass of the Cogsdill Buraway tool chamfers four hole edges on this stamped handle. The job previously required four separate passes—two with a right-angle chamfer, two with a standard tool.

Buraway's spring-loaded blade adjusts for light deburring or up to $\frac{1}{8}$ " chamfer. On down-stroke, just enough pressure exerts to catch the edge; the blade then depresses to pass through the stock. On up-stroke, the under-edge is similarly chamfered.

Buraway works in any head, on automatics or multiple-spindle machines to eliminate many hand or secondary operations. Its costs are often returned the first day. If you debur or chamfer, you need Buraway.

FOR THE ASKING—Complete Cogsdill catalog on Buraway, Baksink, Bear-ingizing and other time-saving tooling.



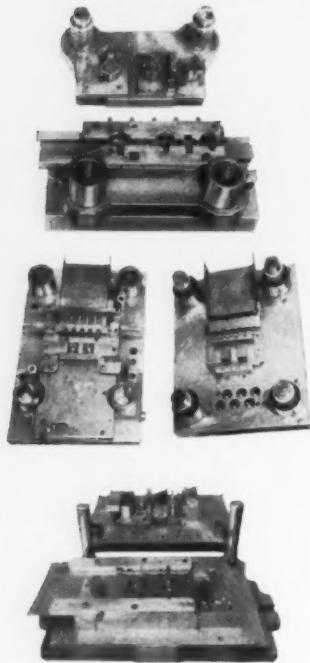
Cogsdill

TOOL PRODUCTS, INC.

12976 W. EIGHT MILE RD., OAK PARK 37, MICHIGAN

For more data circle 333 on Postpaid Card

**Produced by
LATROBE
for long-run
dies...**



Metalmasters



**Fully-Uniform . . .
Free-Machining
DESEGATIZED®
OLYMPIC FM
High Alloy Die Steel**

When your die production calls for long-run service . . . and you need a die steel that yields a superior machine finish without tearing—one that has excellent non-deforming characteristics in heat treatment . . . that's the time to use Latrobe's OLYMPIC FM.

OLYMPIC FM is an air hardening 12% chromium (D-2 type) die steel made to exacting standards by Latrobe Metalmasters . . . guaranteed to be fully-uniform in the distribution of wear-resisting carbide particles and alloy sulphides for better machinability . . . a result of Latrobe's exclusive DESEGATIZED® process of manufacture!

There's a wide range of Olympic FM sizes stocked at branch warehouses near you—Call today!

Or send for Olympic FM Data Sheet today!



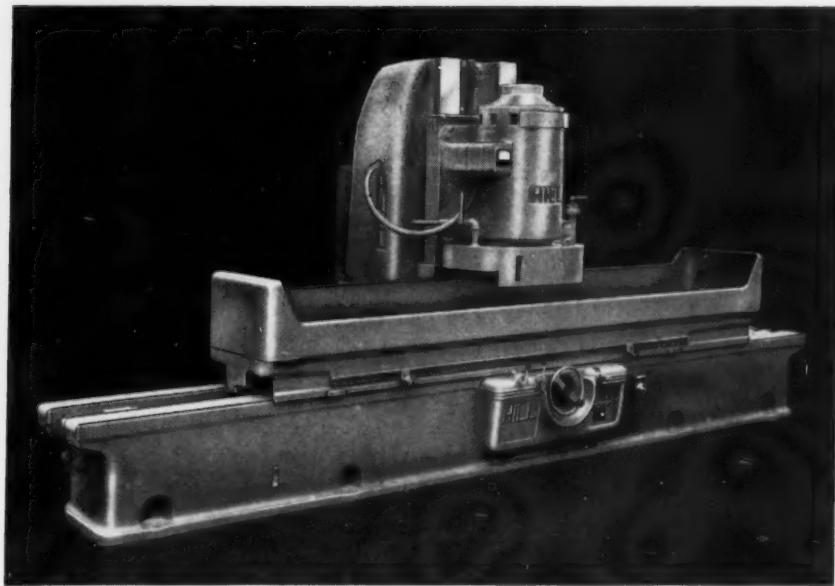
LATROBE STEEL COMPANY

MAIN OFFICE and PLANT: LATROBE, PENNSYLVANIA

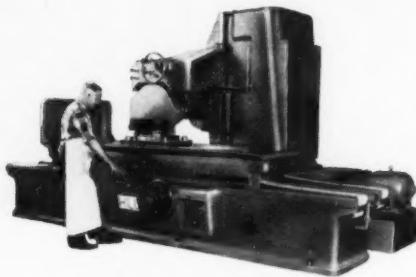
BRANCH OFFICES and WAREHOUSES:

BOSTON • BUFFALO • CHICAGO • CLEVELAND • DAYTON
DETROIT • HARTFORD • LOS ANGELES • MILWAUKEE
MIAMI • NEW YORK • PHILADELPHIA • PITTSBURGH
SAN LEANDRO • TOLEDO

For more data circle 334 on Postpaid Card



Hill Grinder ELIMINATES MILLING OPERATION



For grinding to extremely close tolerances on flats, angles, irregular and special shaped surfaces the HILL Horizontal Spindle grinder is recommended.

Expensive, time consuming milling operations can be eliminated in finishing die blocks, bolster plates etc. with the new HILL Vertical Spindle Hydraulic Surface Grinder. Equipped with either 75 or 100 HP main spindle motor, the segmented grinding wheel provides fast stock removal and produces an accurate finish in approximately half the time required for a combined milling and grinding operation.

The HILL fully hydraulic reciprocating table is adaptable to a wide variety of stock sizes having flat surfaces. Table widths are 18", 24" and 30" with table lengths from 5 to 20 feet.



The **HILL ACME** Company

1201 WEST 65TH STREET, CLEVELAND 2, OHIO

Also manufacturers of: HILL GRINDING AND POLISHING MACHINES • ACME FORGING MACHINES • ROTARY SCRAP SHEARS
• ALLIGATOR SHEARS • "CLEVELAND" KNIVES AND SHEAR BLADES • MATERIAL HANDLING EQUIPMENT • BAR-BULLET SHEARS

For more data circle 335 on Postpaid Card



SIOUX Industrial Abrasive Discs...

More Fibre! Grain! Resin!

Same Price as Regular!

31% more fibre—As compared with regular discs Sioux INDUSTRIAL DISCS have an .010" increase in thickness. This provides a 31% increase in fibre shear strength. Increased shear strength keeps the disc from flying apart under severe use. The SIOUX INDUSTRIAL DISC fibre is a full .040" thick.

39% more grain—39% more grain is used in the SIOUX INDUSTRIAL DISC as compared with a regular disc to substantially increase the number of cutting points exposed to the work surface.

40% more resin—40% more resin is used on the SIOUX INDUSTRIAL DISC compared with a regular disc, to securely bond the extra grain.

More grain, more resin, and more fibre combine to insure that your SIOUX INDUSTRIAL ABRASIVE DISC will cut faster and run longer. They're job designed for the most severe use. They cost no more than regular discs. They're available in all grits. If yours is a heavy duty application specify and order SIOUX INDUSTRIAL DISCS.



SIOUX High Speed Sanders

SIOUX high speed, heavy duty sanders are designed for the most punishing heavy duty, industrial work. They're powerful, dependable, smooth operating. They're equipped with heat treated alloy gears, ball bearings, and are permanently lubricated. SIOUX tools last longer. They're the best buy in the long run.

*Check the Yellow Pages Under "Tools, Electric"
for Your Nearest Distributor*



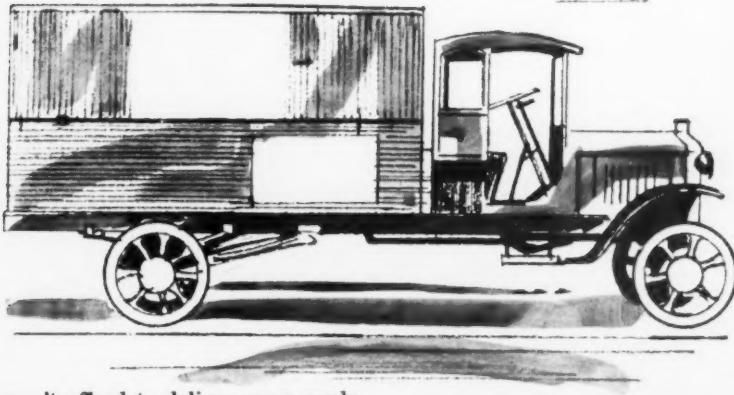
ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

AIR IMPACT WRENCHES • AIR SCREWDRIVERS • ELECTRIC IMPACT WRENCHES • SCREWDRIVERS • GRINDERS
SANDERS • POLISHERS • FLEXIBLE SHAFTS • PORTABLE SAWS • VALVE GRINDING MACHINES • ABRASIVE DISCS.

For more data circle 336 on Postpaid Card

Delivering lost profit\$?



You can't afford to deliver your goods in obsolete equipment; that would be poor economy and tough on your name.

But what about obsolete production equipment? It may be out of sight, but it delivers a far greater loss in wasted time and manpower, excessive unit costs and reduced quality.

You might be surprised how easy it is to turn these losses into profits with a modern Gisholt Turret Lathe. These rugged lathes incorporate all the advantages you need to keep ahead of demands for higher, faster production and lower costs.

Ask your Gisholt Representative about Gisholt Ram and Saddle Type Turret Lathes — how they can be put to work in your plant earning extra profits, paying for themselves. Call him today or write for literature.

GISHOLT
MACHINE COMPANY



Madison 10, Wisconsin

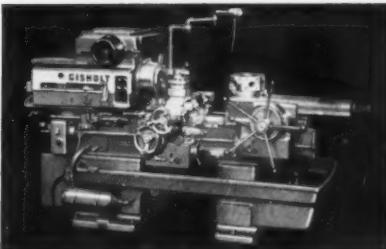
Investigate Gisholt's Extended
Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes
• Factory-Rebuilt Machines with New Machine Guarantee

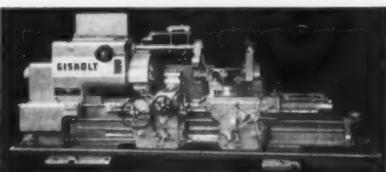
For more data circle 337 on Postpaid Card

July, 1959

modern machine shop 27



Gisholt Ram Type Turret Lathe



Gisholt Saddle Type Turret Lathe



It's easy to see the best dressing stick

Every time you use a NORBIDE* dressing stick both stick and grinding wheel stay in clear sight. There's never a dust cloud from NORBIDE boron carbide. Next to diamonds — and at a fraction of diamond cost — it's the hardest man-made material commercially available, eliminating any dust from the stick itself. Also, a NORBIDE stick throws a spark stream from the wheel, highlighting the exact contact point. It brings

you best results fast, on any dressing job — dressing a cup wheel to a knife edge, free-hand truing of a wheel face, forming a radius, and the like.

Extra hardness means extra long life and extra economy, too. NORBIDE dressing sticks outlast hundreds of ordinary sticks. Order yours today or write for Form 1567, giving more details, NORTON COMPANY, General Offices, Worcester 6, Massachusetts.

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

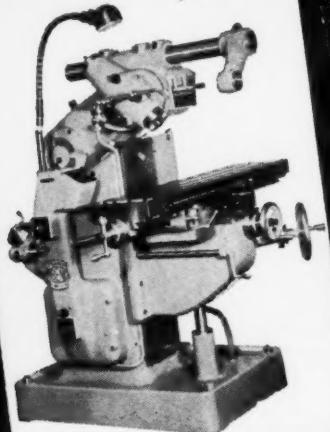
W-1914



Making better products . . . to make your products better
For more data circle 338 on Postpaid Card

Exceptional Values! Available from stock! PRECISION MILLING MACHINES

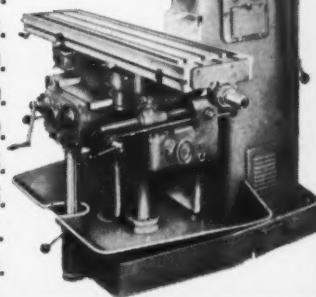
ABENE
VERTICAL HORIZONTAL
MILLING MACHINE
\$3990.



THOUSANDS SOLD TO SATISFIED CUSTOMERS!

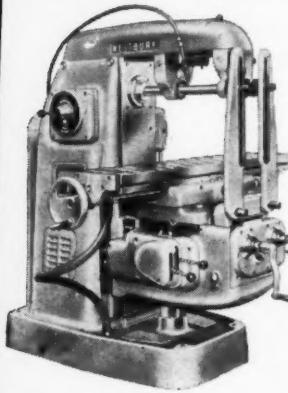
PEDERSEN HORIZONTAL, VERTICAL and combination MILLING MACHINES

Model	Table Size in Inches	Base Price
VPF-00	35½ x 8½	\$1663.
VPV-00	35½ x 8½	\$2463.
VPU-0	39½ x 9½	\$2890.
VPU-1	51 x 12	\$3260.
VPV-1	51 x 12	\$3760.
VPF-2	61 x 12	\$6185.
VPU-2	61 x 2	\$6285.
VPV-2	61 x 12	\$6885.
VPF-4	75 x 16	\$12850.



LIBERAL TERMS • RENTALS

WESTBURY Universal Dial-Type Horizontal Milling Machines



Model	Table Size in inches	Base Price
1U	40 x 10	\$3390.
2U	51½ x 10½	\$5265.
3U	60 x 12½	\$6275.
1-S	42 x 9	\$1690.
Contour	42 x 9	\$3190.

AGENTS WANTED

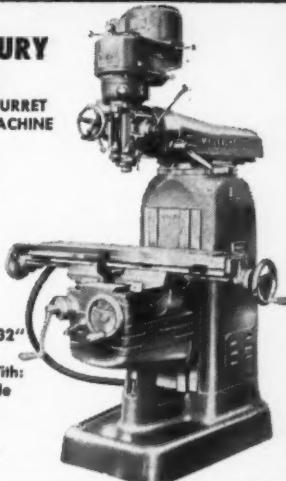
WESTBURY

I-S

VERTICAL TURRET
MILLING MACHINE

\$1595

Incl. Motor
& Controls



1½ H.P. 9" x 32"
Table
Available With:
9" x 42" Table
\$95. extra
Coolant
\$155. extra

AARON MACHINERY CO., Inc.

DEPT. M 45 CROSBY ST., N. Y. 12 • WA 5-8300

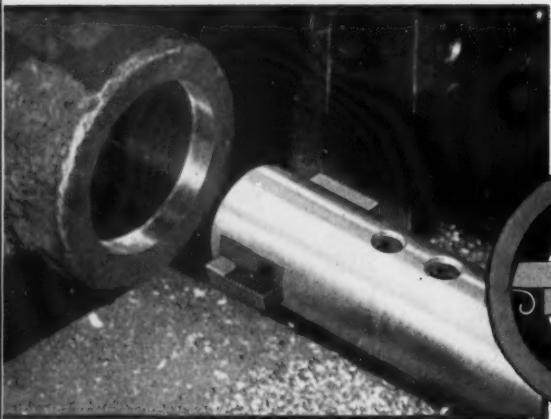
For more data circle 339 on Postpaid Card

BRANCHES AT:

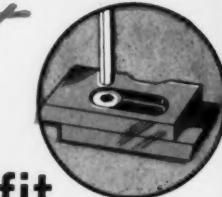
BUFFALO, N. Y. RICHMOND, CAL.
MINEOLA, N. Y. LOS ANGELES, CAL.
HOUSTON, TEXAS

SEE OTHER AD ON PAGE 20

replaceable boring and reaming tools



adjust
to
fit
the
hole!



Save 70% or more in tool costs and production time on holes over 5/8"

- Diameter adjustable within $\frac{1}{4}$ in. range: Blades are expandable as they wear for maximum tool life and accurate tolerance control. Grind blades for tolerance only; not for size.
- Blades replaceable: Madison slotted bars wear indefinitely. You replace blades only, with costs averaging $\frac{1}{3}$ that of solid flute reamers. Down-time for replacement and adjustment is negligible.
- Cut tool inventory: One Madison slotted bar can be used on holes of many varied diameters...since each bar accommodates a broad range of cutter sizes.
- No alignment problem: Madison reamer blades float in the bar slot...are self-

centering in the hole. No floating holders required, no compensation for spindle wear. (NOTE: Boring cutters are fixed in their slots...do not float.)

● Free cutting action, no chip pack-up: Generous chip clearance permits free circulation of coolant for higher speeds, finer finishes, closer tolerances.

● Multiple operations in one pass can be performed simply by spacing standard Madison blades on specially made bars. Any combination of reaming, boring, chamfering and other hole-making jobs can be completed on a variety of diameters...and in one pass!

Write for further information to



MADISON Industries

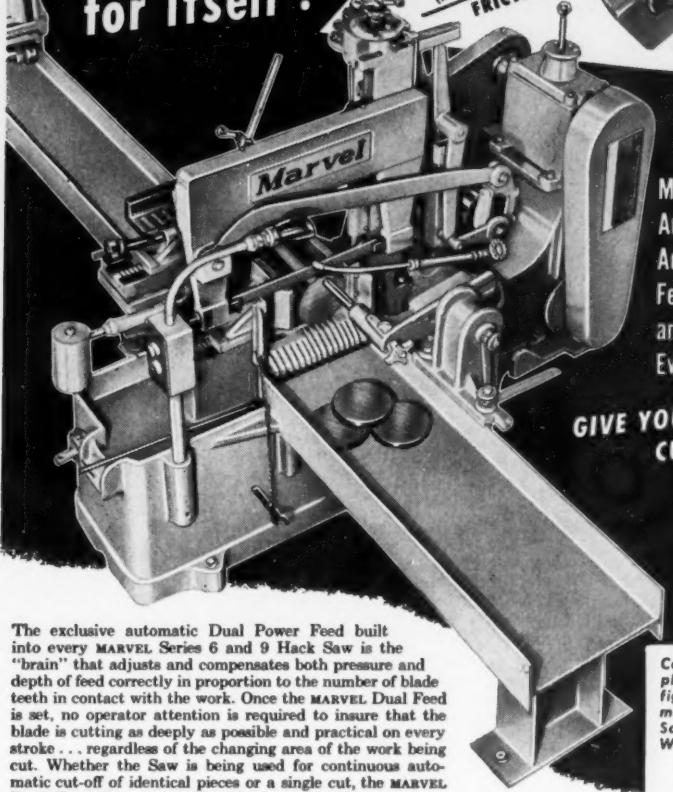
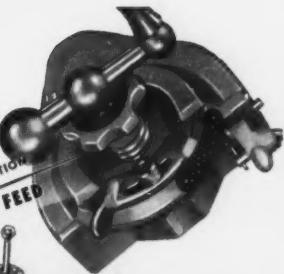
For more data circle 340 on Postpaid Card

Dept. MR7, Box 1137
Providence, R. I.

ever see a **METAL SAW**

that thinks
for itself?

POSITIVE FEED
(MINIMUM PENETRATION)
FRICTION FEED



MARVEL SAWS'
Automatic "Brain"
Adjusts Blade
Feed Pressure
and Depth on
Every Stroke to

GIVE YOU FASTER
CUTTING-OFF

The exclusive automatic Dual Power Feed built into every MARVEL Series 6 and 9 Hack Saw is the "brain" that adjusts and compensates both pressure and depth of feed correctly in proportion to the number of blade teeth in contact with the work. Once the MARVEL Dual Feed is set, no operator attention is required to insure that the blade is cutting as deeply as possible and practical on every stroke . . . regardless of the changing area of the work being cut. Whether the Saw is being used for continuous automatic cut-off of identical pieces or a single cut, the MARVEL Dual Feed that practically "thinks for itself" guarantees that the work is cut-off in the fewest possible number of strokes.

Heavy duty MARVEL Series 6 and 9 Hack Saws embody every practical design and operating feature to give you speed, accuracy and operating economy you can find in no other metal cutting saws.

Catalog C85 has complete details, facts and figures on both Marvel metal cutting Hack Saws and Band Saws. Write for it today.



PS-1304

ARMSTRONG-BLUM MFG. CO.
5700 BLOOMINGDALE AVE. - CHICAGO 39, ILL.

MARVEL Metal Cutting
SAWS.
Better Machines-Better Blades.

For more data circle 341 on Postpaid Card

July, 1959

modern machine shop 31

Experience—the added alloy in Allegheny Ludlum tool steels



Careful addition of sulfur to melt guarantees typical sulfide distribution, as shown in photomicrograph of longitudinal specimen of EZ MACHINING tool steel.

Sulfur addition to melt held to narrow range in Allegheny Ludlum's EZ MACHINING GRADES

**Uniform, finely-distributed sulfides
mean uniform machining, uniform high finish,
uniform long tool life order after order**

Adding sulfur, actually an impurity, to a tool steel melt to make it free-machining must be done with care and precision. That's why Allegheny Ludlum maintains an extremely close average range in adding sulfur to its EZ MACHINING grades. But mere range, however narrow, is not enough. A-L has developed special techniques in adding sulfur and nucleating agents to produce the uniform, finely-distributed sulfides that characterize good free-machining tool steels.

A-L's extra care means you can standardize your machining operations from piece to piece and order to order. This reproducibility is reflected in uniform machining; uniform high finish; uniform long tool life.

For example, in the production of hobs these machining properties in Allegheny Ludlum's EZ MACHINING steels minimize the costly "backing off" operation for back clearance of multiple teeth, eliminating complicated extra heat treatment. Lower residual stresses are set up, because the steel has a lower resistance to the cutting action. Naturally, hobbing is only one of the situations where these free-machining characteristics can benefit you.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.
ALLEGHENY LUDLUM STEEL CORPORATION,
Oliver Building, Pittsburgh 22, Pa. Address Dept. MS-19.

WSW-7255

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country... Check the yellow pages
every grade of tool steel... every help in using it

For more data circle 342 on Postpaid Card



**NOW, no more part-time milling machine with
with**

J & S NO-BEND

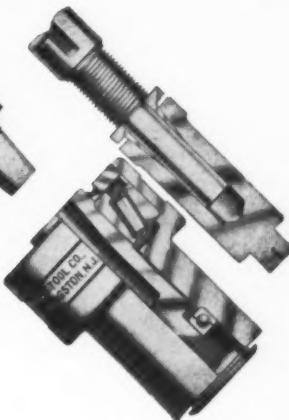
**hardened & ground
detachable**

**Milling machine ARBORS,
ADAPTERS and
live bearing supports**

**Full-time tooth
engagement, plus all
these features:**

Interchangeable to 40 or 50
taper machines • quick change

- lower cost • more production
- longer cutter life • correct arbor
length • tool adapters • high speed rugged live bearing
support.



Write for free literature and price list.

WHEEL DRESSERS **J & S** JAW CLAMPS • PRECISION VISES • DOWN-HOLDING DEVICES

J & S TOOL CO., INC.

CLAMP CUT

871 DORSA AVE.
LIVINGSTON, NEW JERSEY

For more data circle 343 on Postpaid Card

TWO MORE* ALL

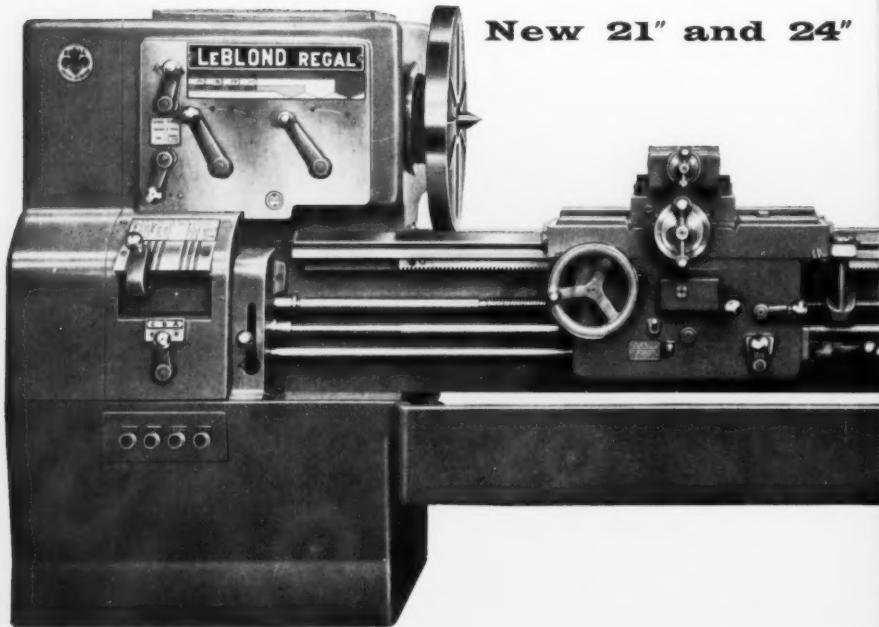
The new 21" and 24" LeBlond Regals give you capacity, speeds and horsepower you'd find in more expensive heavy type machines offered by other builders—and at one of the most attractive prices LeBlond has ever offered!

Here's the rundown. Standard 7½ HP, optional 10 HP for high speed ranges in both models (see chart); electric clutch and brake; feed reverse at the apron; heat-treated gears in head, quick-change box and

apron—plus all the famous big-lathe features that have made LeBlond Regals production favorites from coast to coast.

Headstock uses the same combination gear-belt drive construction that proved itself on the famous LeBlond Dual-Drive and is now incorporated on our new 16" heavy-duty lathe. Bed has hardened and ground replaceable steel ways like the ways on our larger machines. They are fitted according to the compensating

TWO MORE* ALL



New 21" and 24"

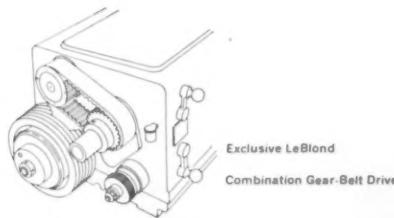
NEW LE BLONDS

veeway principle to insure better distribution of forces for proven long-time accuracy and minimum wear.

Again, like higher-priced lathes, Regals are equipped with both feed rod and preloaded precision leadscrew for continued accuracy in thread chasing. Other big-lathe features—3 bearing spindle. Automatically-lubricated quick-change box. Wide carriage bridge with ample bearing surface. Rugged tailstock with plug clamping. In addition, you get general dimensions and construction details patterned after LeBlond heavy-duty engine lathes.

All of LeBlond's 70 years of experience has gone into the design and building of these new Regals. Only from the builder of a complete line of lathes can you get a low-priced lathe with all these big-lathe features. Get full details on the new 21" and 24" LeBlond Regal Lathes. See your LeBlond Distributor or write for complete information.

NEW LE BLONDS



Exclusive LeBlond
Combination Gear-Belt Drive

Regal lathes deliver up to 10 H.P.!



STANDARD AND OPTIONAL SPEED RANGES 21" and 24" REGALS	
12 Standard Speeds:	
Gear Drive	18, 25, 35, 49, 70, 98, 136, 192 rpm.
Belt Drive	260, 362, 510, 720 rpm.
12 Optional Speeds:	
Gear Drive	27, 38, 53, 74, 105, 146, 204, 288 rpm.
Belt Drive	390, 544, 765, 1080 rpm.

... cut with confidence

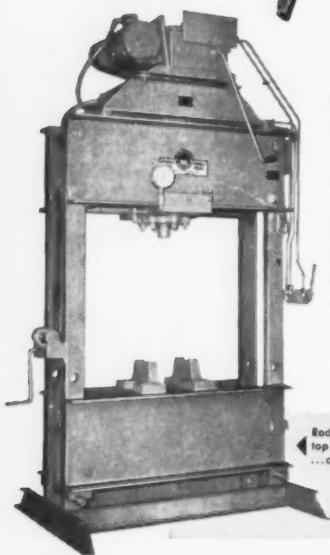
THE R. K. LEBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio



*World's Largest Builder of A Complete Line of Lathes for
More Than 70 Years*

For more data circle 344 on Postpaid Card

A Rodgers Shop Press is BEST for YOU!

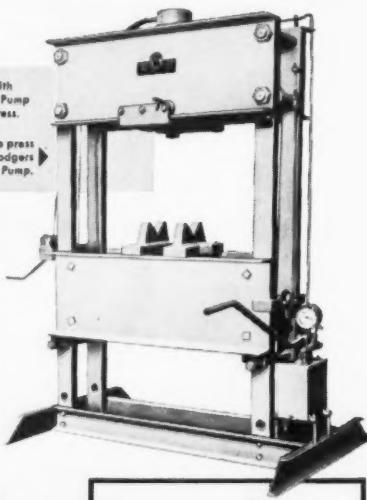


HERE'S WHY:

- LONGEST RAM TRAVEL with maximum hydraulic power throughout entire stroke.
- REMOVABLE CYLINDER for independent hydraulic power away from the press.
- CYLINDER TRAVEL full width of press, either way.
- OPEN ENDS allow long pieces to extend through sides of press.
- EXTRA WIDE inside work space to handle bigger jobs more easily.
- GREATER STRENGTH with heavy bar stock sides and pins—bearing blocks support bolster to give uniform distribution of pressure.

Rodgers 100 ton shop press with top mounted Greenlee Power Pump...cylinder travels width of press.

Rodgers 100 ton shop press with Rodgers 2 speed Hand Pump.



WHEN YOU INVEST in a shop press it is more important to compare performance than initial cost!

Rodgers Shop Presses are designed and built for the most versatile service, and longest trouble-free life. In the shop they handle hundreds of diversified jobs...pressing, bending, straightening, assembling. For field work the Rodgers cylinder and pump are easily removed from the press, making an ideal portable power unit for jacking, lifting, heavy shaft removal and similar work.

Rodgers produces the most complete line of shop presses available—capacities from 60 to 400 tons—in varied standard models with power pumps, top mounted or placed at the side—or hand pumps with 2 or 3 speeds.

When you compare shop press performance and cost you will find a Rodgers is best for you, too. Ask your Rodgers Representative for complete details—or write us.

SEND FOR NEW CATALOG ...

It gives useful information and complete specifications.



Rodgers Cylinder and Pump are easily removed from shop press (such as above) for off-press jobs.



RODGERS HYDRAULIC, Inc.

Pioneers in High Pressure Hydraulics Since 1932

7447 WALKER STREET • MINNEAPOLIS 26, MINNESOTA

For more data circle 345 on Postpaid Card

NOW...index tables

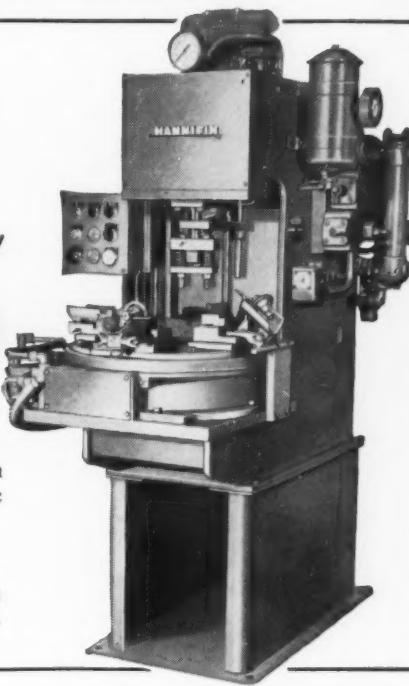
FOR MORE
ECONOMICAL
PRODUCTION
ON THESE NEW

HANNIFIN "FD" PRESSES

Heavy-duty open-gap production presses with Hannifin hydraulic index tables . . .

Available in all of these sizes:

2, 3, 4, 5 and 6-ton bench models
6, 8, 10, 12 and 15-ton floor models



WITH THESE FEATURES...

- Dual Safety Hand Lever Controls
- Dual Electric Push-Button Controls
- Adjustable Stroke Control
- Reverse on Pressure or Distance
- Full Automatic Cycling
- Hannifin High Speed Hydraulic Index Tables
- Reciprocating Hydraulic Slide Feeds

USE THEM FOR...

- Assembly Operations
- Riveting—Staking
- Forming—Stamping
- Trimming Die Castings
- Trimming Plastics
- Molding Semi-Conductors
- Preformed—Compacting

Call in your nearby Hannifin man—he's a trained production analyst—to prove how you can do more at lower cost with Hannifin presses. Or, write for our new Bulletin 132. It tells the whole story.

HANNIFIN COMPANY

565 South Wolf Road • Des Plaines, Illinois

— A DIVISION OF PARKER-HANNIFIN CORPORATION —

For more data circle 346 on Postpaid Card

Cost-Cutting-

A SIMPLE
MATTER OF
SELECTION



COUNTERBORE SETS

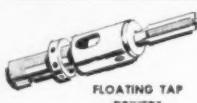


INVERTED SPOT
FACERS



COUNTERBORES—

COUNTER SINKS,
HOLDERS, PILOTS



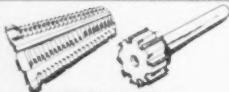
FLOATING TAP
DRIVERS



INSERTED
BLADE
FACE MILLS



MULTIPLE
DIAMETER
BORING
CUTTERS



GROUND MULTIPLE
THREAD MILLING CUTTERS



GROUND AND UNGROUND
FORM-RELIEVED CUTTERS



SINGLE-POINT
CARBIDE TIPPED TOOLS



MULTIPLE STEP
BORE REAMERS



CARBIDE
TIPPED
CYLINDER
BORING CUTTERS



DOVETAIL
FORM TOOLS



CARBIDE
TIPPED
BROACH
SECTIONS



INVOLUTE SPLINE
SHELL TYPE BROACHES



59-37

Since 1921, Continental has specialized in cost-saving cutting tools, producing design innovations in hardened, high-speed tool steel, carbide and special-alloy cutting materials.

Job-tested in the toughest proving ground—Ex-Cell-O's own machine tool and precision parts production lines—CTW Cutting Tools come to you ready to increase the output of even your best machines!

See your local Ex-Cell-O Representative, or write direct to Continental Tool Works Division for full details. In Canada, contact Colonial Tool Co., Ltd., Windsor.

Continental **TOOL WORKS**

DIVISION OF

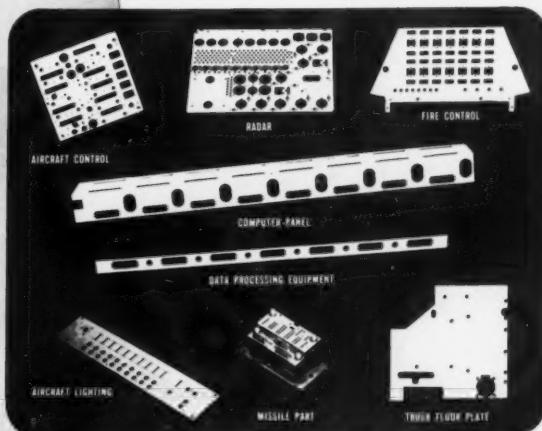
EX-CELL-O

CORPORATION
DETROIT 32, MICHIGAN

For more data circle 347 on Postpaid Card

COST ANALYSIS SHEET

how to take the "Hidden Costs" Out of Low Quantity Production

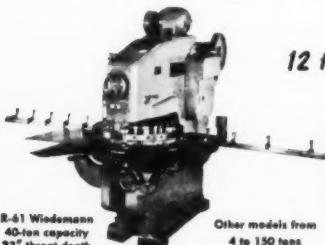


Multiple handlings . . . special die sets . . . multiple tool setups . . . hand layout . . . burning . . . nibbling . . . drilling . . . deburring . . . excess inventory, etc.

These and many other "hidden costs" in sheet metal fabrication are eliminated by Wiedemann Turret Punch Presses. Parts are produced as needed on a press specifically designed for producing a wide variety of jobs in quantities ranging from one to several hundred of a kind.

All tools normally required are in the turrets ready for use. Work is accurately positioned by a quick-setting mechanical gauge. Even extensive engineering changes can be made on-the-spot at low cost. Direct savings of 60% to 90% pay for the press in two years or less.

Find out how you can eliminate your "hidden costs" with the Wiedemann Method. Send drawings of your work for time study and write for Bulletin 301 today.



R-61 Wiedemann
40-ton capacity
33" throat depth

Other models from
4 to 150 tons

12 to 32 Punches and Dies Ready for Use



WIEDEMANN
MACHINE COMPANY
TURRET PUNCH PRESSES

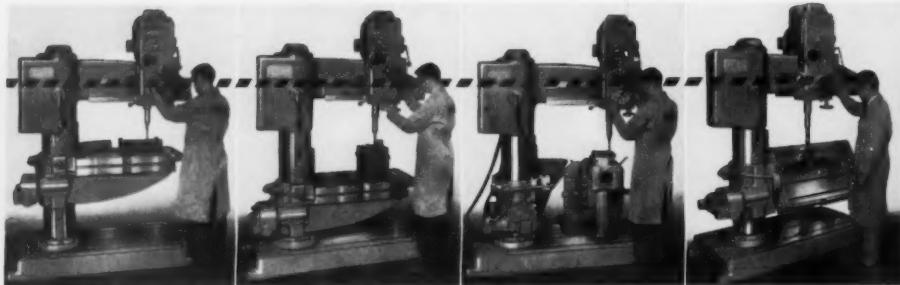
DEPT. AM-7 • GULPH ROAD • KING OF PRUSSIA, PA.

For more data circle 348 on Postpaid Card

July, 1959

modern machine shop 39

no reaching
or crouching
for any job



WITH A **FOSDICK** SENSITIVE RADIAL DRILL

You can drill holes up to $1\frac{1}{2}$ ", in small or large work—all from the same normal operating position on this unique machine.

The Fosdick Sensitive Radial Drill is another in a long line of Fosdick "firsts." It fills the gap between the Radial and Sensitive or Upright Drill, gives you exceptional versatility, plus operator convenience never possible before.

The arm of this machine—always at the same height—swings 360°. The table, which moves up and down on the one-piece column, also swings 360°. It may be provided with the tilting feature illustrated. A machine base is provided for work too large for the clearance between spindle and table.

Get the whole story on this unique machine. Its moderate price and outstanding features will mean more profitable drilling in your shop. Call your Fosdick Distributor today or write for Bulletin SRS.

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

RADIAL DRILLS
SENSITIVE AND UPRIGHT DRILLS
ING BORERS & GRINDERS
NUMERICAL CONTROLLED
PRECISION BORING MACHINES
SENSITIVE RADIAL DRILLS

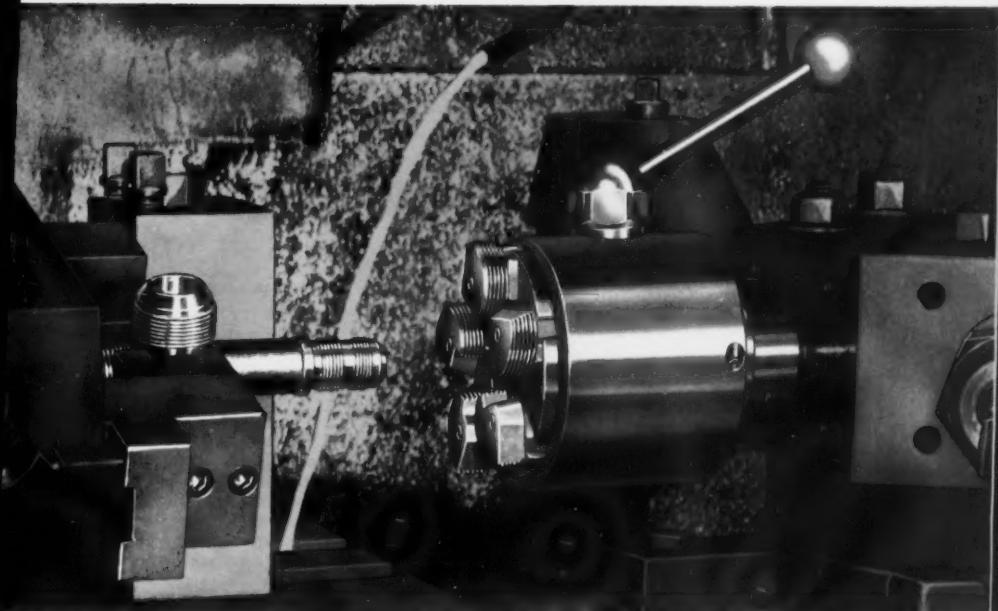


For more data circle 349 on Postpaid Card

*When Threading Specs
Read A.Q.R. . .*



Parker standardizes on 5 Chaser Vers-O-Tools



$1\frac{1}{4}$ —12 and $1\frac{1}{8}$ —12 threads cut on this 316 stainless steel forging. A 30 microinch finish is maintained.

"Additional Quality Required" are by-words for this leading manufacturer of precision fittings. The rigid specifications for critical missile components produced in their Cleveland, Ohio plant demand better than aircraft quality. "That's why we use Namco Vers-O-Tools almost exclusively," says D. S. Manning, Manager, Parker Fittings & Hose Division, Parker-Hannifin Corporation. "These automatic 5 chaser die-heads eliminate lead error, taper and grooves on the thread flank . . . with overall thread quality at least 50% better than 4 chaser heads. The result is precision fittings with true seating surfaces and a perfect gauge fit."

Prove these facts for yourself: more pieces per grind; precision threading of parts with undercuts, flats, slots; unsurpassed economies in chaser grind-

ing and precise relocation of chasers without re-adjustment . . . and a complete range of sizes. Namco 5 chaser Vers-O-Tools are only a part of a complete line of threading tools designed to provide the tolerances and finish required for your toughest jobs. Write for complete information.

**National
Acme**

The National
Acme Company
183 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N. J.;
Chicago 6, Ill.; Detroit 27, Mich.

For more data circle 350 on Postpaid Card

Mill Odd Shapes

...with Barber-Colman Form-Relieved Cutters



We don't expect you to have a job exactly like this . . .

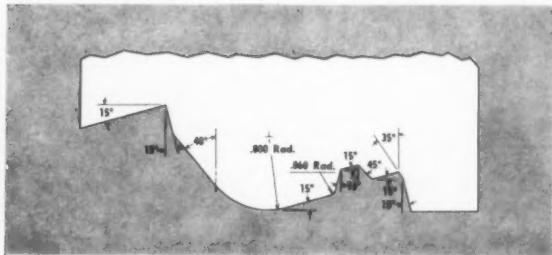
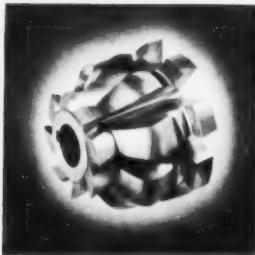
. . . but the manner in which cutter design was established may illustrate important benefits gained by submitting part prints to the Barber-Colman Tooling Service.

Whether you have irregular forms or a combination of straight surfaces to machine, a comprehensive engineering analysis will help you determine the one best cutter for increasing accuracy and combining operations economically.

Electronic computer aids cutter design

This cutter requires a 10° helix and a 10° positive radial rake to produce the accuracy and smooth finish on the part. The helical flutes and radial rake make it necessary to calculate the cutter tooth form which will produce the desired part form. All plot points, formerly obtained manually, were determined rapidly and accurately on a Bendix computer. Only the points where a change in form

in One Operation



occurs were obtained manually. Over 60 other points were determined quickly by the computer. An electronic computer has the following advantages for you:

1. Accurate cutters — A direct solution is possible through the application of mathematical formulas which eliminate trial-and-error solutions. The great number of plot points which can be determined quickly and accurately assures exact duplication of complex shapes.

2. Economical design — You get the highest possible number of engineering man-hours devoted to actual development of the cutter because fewer hours are required to work out details.

3. Faster service — Speed of computation permits us to check a number of designs and still meet reasonable delivery schedules.

4. Flexibility to change — All variables other than form, such as helix angle, side clearance, number of teeth, cam, diameter, rake, etc., can be changed at any stage of engineering without rigidity at

our end. There's no incentive to "save" a design should a different helix angle or diameter be desired. Design of this cutter included a cutting clearance problem. If the part were set square with the cutter, a two-piece cutter with axial relief in both directions would be required. However, by tipping the part at 15°, a one-piece cutter can be used.

Let us analyze your milling operations

The Barber-Colman Tooling Service is the most complete milling cutter facility available under one roof. Your part drawing can be evaluated in terms of every cutter style, for which we have complete manufacturing facilities: (1) standard or special cutters, or a combination of these in a gang; (2) high-speed steel or carbide-tipped; (3) eccentric-relieved or profile-type; and (4) ground or unground form.

There is a lot of wisdom in re-checking operations periodically in

terms of new tooling and methods. This is not a difficult or costly thing to do. Yet it may reveal golden opportunities to tighten up tolerances, improve surface finish, or reduce manufacturing costs. It may be on a time-consuming planer job, a series of flat-surface milling operations, complex form milling, or even new pieceparts.

How about putting the Barber-Colman Tooling Service to the test? It will cost nothing to submit part prints or discuss your jobs personally with a Tooling Specialist. We're ready any time you are. Call your nearest Barber-Colman field office or the factory — TR 7-5741.

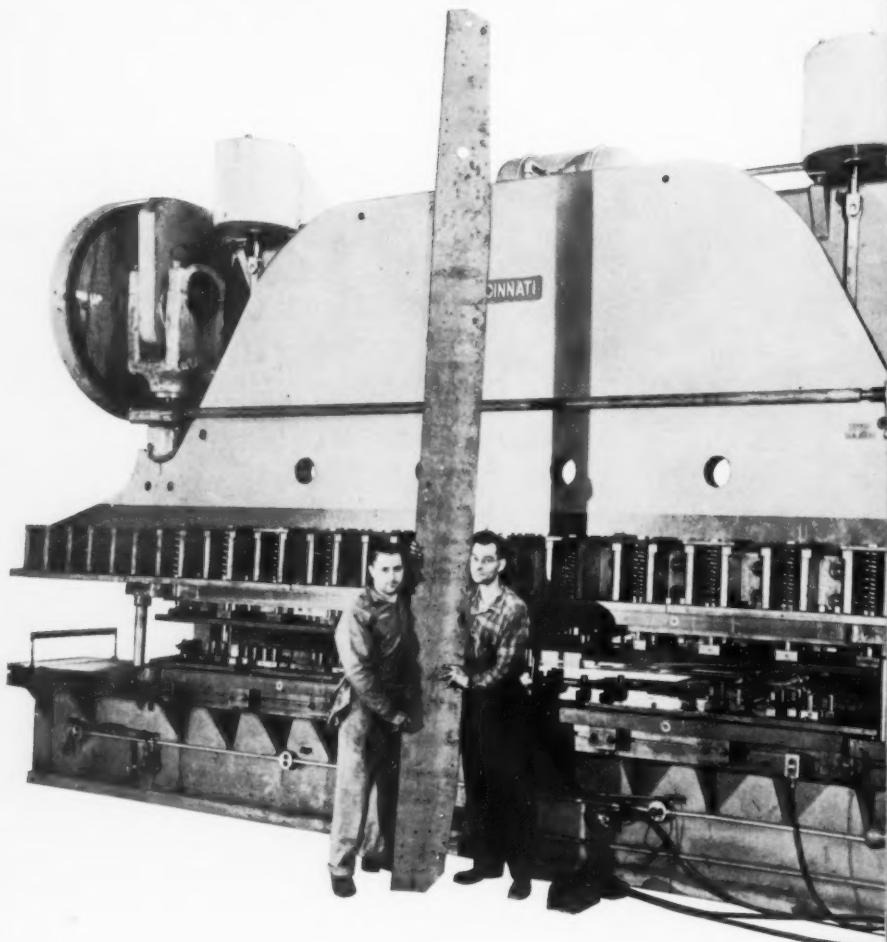
Barber-Colman Company



74 Loomis Street, Rockford, Illinois

For more data circle 351 on Postpaid Card

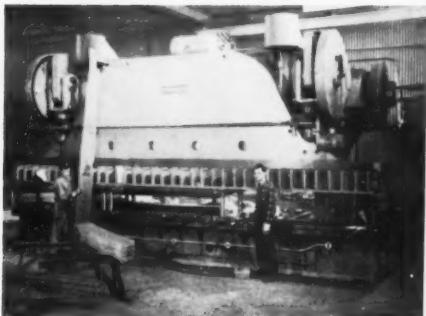
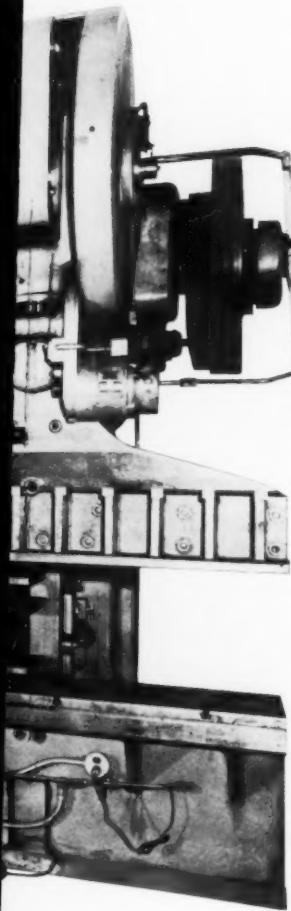
70 minutes



Punching floor-to-floor time cut from 36 to $1\frac{1}{3}$ minutes.

Photos courtesy Fort Wayne Structural Steel Co., Inc.

cut to 2.6 min.



Blanking floor-to-floor time cut from 34 to 1½ minutes.

In combined blanking and punching operations, production time has been cut 96.2% on these long truck side rail reinforcements, thanks to the versatility of this Cincinnati® All-Steel Press Brake.

Operating data, furnished by John L. Hayner, President Fort Wayne Structural Steel Co., Inc., show how his company substantially slashed production costs.

They decreased floor-to-floor time from 34 minutes to 1½ minutes on blanking $\frac{1}{4}$ " C1010 Steel with a 202" cutting edge. By punching 130 holes per stroke, floor-to-floor time reduced from 36 minutes to $1\frac{1}{3}$ minutes.

Talk with our Application Engineering Department about applying a time-cutting Cincinnati Press Brake in your shop. It can be the most profitable decision you've made this year. Write Department G for Press Brake Catalog.

Shapers / Shears / Press Brakes



**THE CINCINNATI
SHAPER CO.**

Cincinnati 11, Ohio, U.S.A.

For more data circle 352 on Postpaid Card

July, 1959

modern machine shop 45

FINALLY . . .
A DIAL INDICATOR
WHOSE MOVEMENT
MECHANISM IS
SO WEAR-RESISTANT
. . . SO SHOCK-
RESISTANT . . . THAT
YOU WILL PROBABLY
NEVER HAVE TO
REPAIR OR
REPLACE IT!



We say "probably" because it's likely that some MIRACLE MOVEMENT Indicators will meet up with such out-and-out abuse that their operation may ultimately be impaired. But, given the same hard shop usage as any other Dial Indicator, a MIRACLE MOVEMENT Indicator will outlast it many times over.

The MIRACLE MOVEMENT Indicator is not only wear-safe . . . it's also shock-safe. Contrary to what you might expect, no supplemental, "extra-price" devices need be added to the movement to obtain this protection. The MIRACLE MOVEMENT itself is shock-safe. So you get this protection automatically. You do not have to specify it . . . you do not pay extra to get it. Every MIRACLE MOVEMENT Indicator has it.

Nor do you have to specify MIRACLE MOVEMENT in order to get the finest Indicator of them all. From now on, *all* Federal Dial Indicators, except Super-Sensitive and Special Movement Models, will have the MIRACLE MOVEMENT. So, to have all these important features . . . all you have to do is specify Federal.

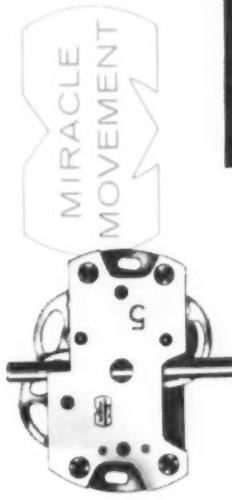
And, as you might expect, your present Federal Dial Indicator can be converted easily because the MIRACLE MOVEMENT is also available separately as a replacement unit, either Full-Jeweled or Plain Bearing. It fits into a current Model Indicator case without any changes.

You owe it to better, longer lasting accuracy and to drastically reduced Indicator maintenance costs to standardize on Federal MIRACLE MOVEMENT Indicators

. . . certainly the finest of them all.

For more data circle 353 on Postpaid Card

FEDERAL PRODUCTS CORPORATION
9147 EDDY ST., PROVIDENCE 1, R. I.

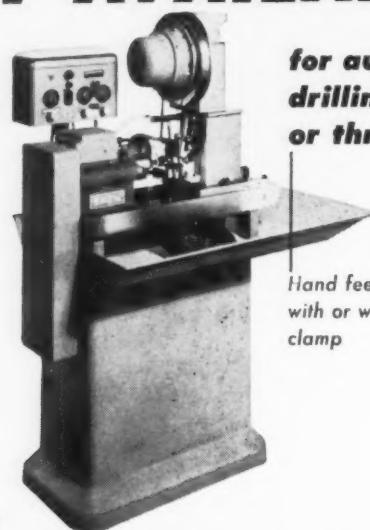


FEDERAL *Ask First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

for recommendations in modern gages . . . Dial Indicating • Air • Electric or Electronic — For Inspecting, Measuring, Sorting, or Automation Gaging.

NOW AVAILABLE...



**for automatic
drilling, tapping
or threading**

Hand feed or hopper feed
with or without air-operated
clamp

NOW...drill rivets faster with minimum tooling costs



Drills 500-3600 per hour;
hopper feed; air-operated
clamping. Capacity #74
(.0225") to $\frac{1}{4}$ " in mild steel.



Taps 4000 per hour
hand feed magazine.
Capacity #0 to $\frac{1}{4}$ " fine
pitch in mild steel.

A new horizontal version of the same operating principles long used in Snow vertical machines. Snow machines reduce changeover time, and cut tooling costs to a ridiculous minimum. On your next job, let us show you what the Snow method can do. Submit samples and prints.

Snow Manufacturing Company, Dept. G, 435 Eastern Avenue,
Bellwood, Illinois (Suburb of Chicago)

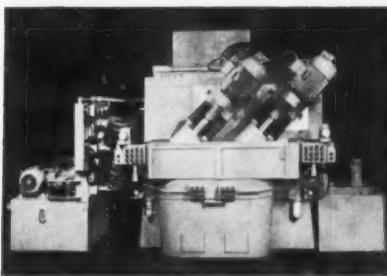
SNOW

master fixtures save dollars and days in tooling costs

For more data circle 354 on Postpaid Card

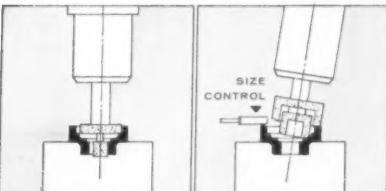
Vertical grinding reduces setups

SPRINGFIELD



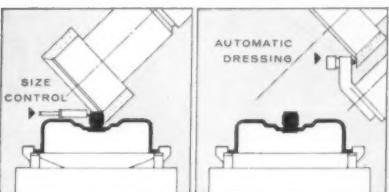
One head grinds while the other retracts for dressing, unloading and loading.

The double spindle Springfield vertical grinder in the photo is typical of vertical grinders automotive production men are using to 1) reduce setups, 2) improve grinding productivity, and 3) save floor space.



Transmission sun gear, 4 surfaces ground in 2 operations.

Two double spindle vertical grinders grind 330 gears per hour. Size control and wheel dressing are accomplished automatically. Typical machine cycle shown below.



Transmission housing hub, 1.-form grinding with automatic size control; 2. spindle retracted for automatic dressing while operator unloads machine.

When part requirements change, only dresser, fixtures and sizing devices change—the machine itself has a long production life because heads can be repositioned easily.

Springfield special vertical grinders, with any desired degree of automation, pay for themselves in two years or less on long runs; standard Springfield vertical grinders pay off rapidly in large toolrooms and job shops.

We'd like to discuss with you the principle of vertical grinding, vertical contour grinding, and subsequent cost savings. Please send today for illustrated Bulletin 197-B. The Springfield Machine Tool Company, Springfield, O.

For more data circle 355 on Postpaid Card

UNIVERSAL JIG AND FIXTURE COMPONENTS AND CLAMP ASSEMBLIES

Shown here are a few of more than a thousand different items in regular steel and stainless steel—the largest and most complete selection in the United States—now available from Universal Engineering Co. Write today for your copy of the complete, new catalog.



213

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS



Floating Chuck



Standard Collet Chuck



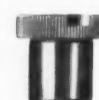
Mikro-Lok Boring Bar



Boring Chuck



"Kwik-Switch"
Tool Holder



Standard Drill Bushing



Wedge-Lock
Production Vise

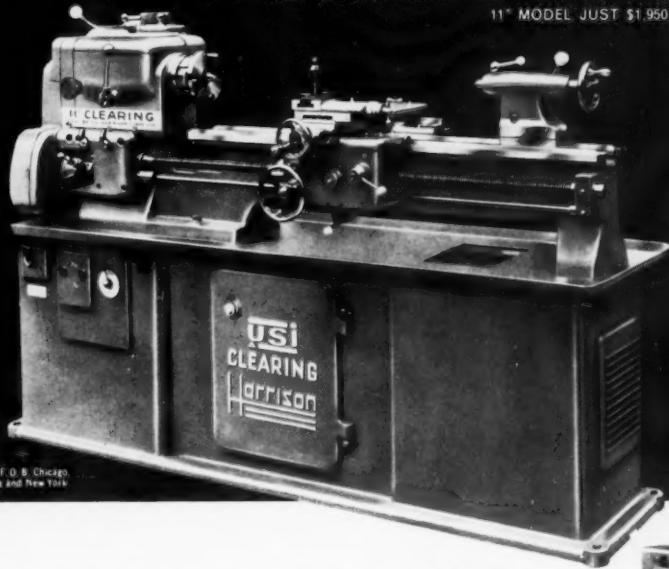
UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 9, MICHIGAN

For more data circle 356 on Postpaid Card

HERE IS *QUALITY*
AT A SENSIBLE PRICE

the NEW CLEARING-HARRISON

11" MODEL JUST \$1,950*



*Base Price F.O.B. Chicago
Los Angeles and New York

Not only does the Clearing-Harrison look like a lathe that should cost 50% more than its list price, it performs that way. And it will continue to perform year after year as only a fine machine tool built to uncompromisingly high standards of precision can.

It has taper roller bearings in the spindle, hardened and ground ways, precision hobbed, heat treated nickel chrome gears. A removable section in the bed provides a gap giving a maximum swing of 18 $\frac{1}{4}$ " on this 11" lathe. These and other fine features are found only in the Clearing-Harrison—sold and backed by Clearing division of U.S. Industries, Inc.

Delivery is immediate on this and on 13" and 16" lathes, too. Find out more about these and the many other benefits you get on the Clearing-Harrison. Write Clearing for details.

Clearing, division of U.S. Industries, Inc., also manufactures the Clearing-Axelson line of engine lathes, power presses of all types, dies and special tooling, and special equipment for the aircraft and missiles industry.



• 13" Swing \$2,850



• 16" Swing \$4,450

Also available with factory-built copying attachments.

Coast to Coast Service Facilities

Clearing's nationwide facilities assure you of prompt service always. Replacement parts and accessories are stocked at Clearing and are available through all three plants, at all service centers and through all Clearing dealers.



DIVISION OF U.S. INDUSTRIES, INC.

6499 W. 65th Street • Chicago 38, Illinois
Plants in: Chicago, Ill. • Hamilton, Ohio • Los Angeles, Calif.

usi
 **Clearing**

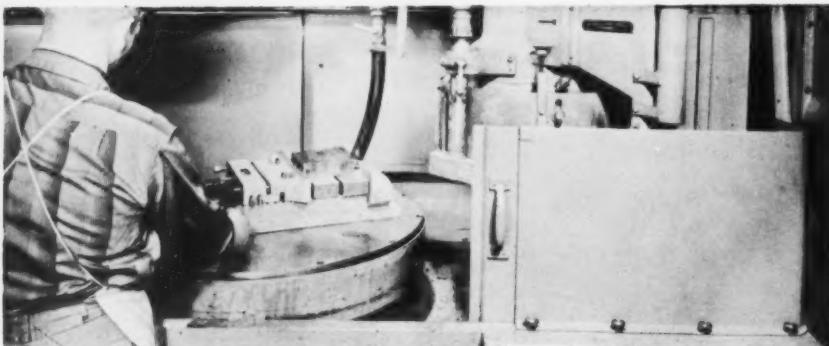
For more data circle 357 on Postpaid Card

MATTISON
HIGH-POWERED
PRECISION

**GRINDING
METHODS**

Fast, new grinding method replaces cutter-type machining

Better production time by 75%... removes up to $\frac{1}{4}$ in. stock per side... economically



Three shapers replaced... machining time cut from 6 to $1\frac{1}{2}$ hr... up to $\frac{1}{4}$ in. stock removal per side economical with new method...

These are results from a Michigan company after installation of a Mattison No. 24 vertical-spindle surface grinder with Quick-Tilt spindle. Such performance proves that a rigid, high-powered vertical is now... more than ever... a stock-removal machine as well as a precision grinder.

Two machines for the price of one
Until the introduction of the Quick-Tilt spindle rotary late last year, grinding dead flat parts on a production basis meant accepting one of two types of inefficiency: (1) excessive downtime for changing one machine from a rougher to a finisher... or (2) "two-timing"—keeping two grinders set up for successive roughing and finishing.

Now, a flick of the switch tilts the spindle for rough and finish operations in a single setup. In effect, you get two machines for the price of one.

The Quick-Tilt rotary combines high horsepower (60 on the No. 24—100 on the No. 36) and rugged construction with the right features for precision work.

Hidden savings a big factor

Another reason it pays to own a new Mattison is reduction of hidden costs. You can reduce stock allowances and eliminate cutter-type machining of flat surfaces. With self-dressing wheels, machine downtime for changing the cutting tool and cost of resharpening can be eliminated. This is important because machining time on a surface grinder is often less than on a machine producing much bigger chips. Hard spots, burned edges, and tough scale are no problems for a grinding wheel.

Ask for a test grind

Send us your pieceparts for a sample grind. There's no cost for a complete report covering stock removal, wheel life, production rate, wheel specs, surface finish, accuracy, etc. Your Mattison dealer will make the arrangements—or, phone the factory direct.

MATTISON MACHINE WORKS
Rockford, Illinois • WOedland 2-5521



**HIGH-POWERED
PRECISION
SURFACE GRINDERS**

For more data circle 358 on Postpaid Card

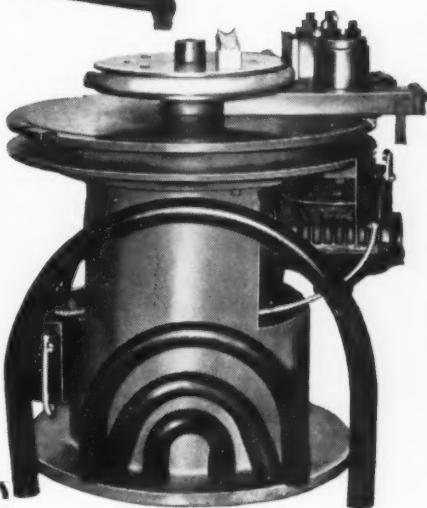
on
the
fence?

Are you undecided on the most economical way to bend pipe, tubing or structural metal parts?

Let Pedrick show you some surprising figures on "multiple bending" with PEDRICK PRODUCTION BENDERS.

Write PEDRICK TOOL and MACHINE COMPANY, 3640 N. Lawrence St., Phila. 40, Pa., Dept. 5.

PEDRICK
PRODUCTION BENDERS



*Free "Pedrick Line" Bulletin.
Write today.*

For more data circle 359 on Postpaid Card

CAREFUL!

Thirty years of broachmaking — careful creation of thousands of standard and custom-made broaches — assures unmatched efficiency and performance from CTW Broaches.

Find out how Continental's experience can cut down-time and increase output in your operation. Call your Ex-Cell-O Representative. In Canada, contact Colonial Tool Co., Ltd., Windsor.

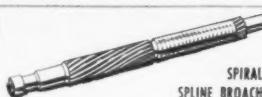
59-38

CTW
Continental
TOOL WORKS
DIVISION OF
EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

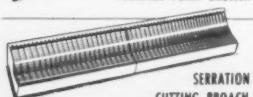
With the sure, careful touch of an experienced hand, veteran CTW heat-treat man hoists 72" broach from a vertical furnace.



PINETREE FORM BROACH



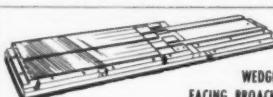
SPIRAL SPLINE BROACH



SERRATION CUTTING BROACH



INVOLUTE SPLINE SHELL-TYPE BROACH



WEDGE FACING BROACH



CARBIDE-TIPPED BROACH SECTIONS

For more data circle 360 on Postpaid Card



*the master mechanic's way
with oilstones*

deburring . . .

whether deburring and honing small knife blades for hand cutters, or chamfering and fitting close tolerance dies . . . hand stoning is the better way for precision work, for better cutting edges, for higher quality finishes, and for longer tool life. Send for your free copy of the Hand Stoning Handbook to Dept. MS-7.

BEHR-MANNING CO.
TROY, NEW YORK
A DIVISION OF NORTON COMPANY



BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals

For more data circle 361 on Postpaid Card

July, 1959

modern machine shop 55



STANDARD BROACHES from STOCK

Minute Man

KEYWAY
BROACH KIT



In one minute and for as little as one cent you can cut a keyway with the Minute Man Keyway Broach Kit. For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{1}{4}$ " to 3".

**SAVE TIME AND MONEY
WITH THESE OTHER STANDARD
STOCK BROACHES**

SQUARE BROACHES — $\frac{1}{8}$ " to $\frac{3}{4}$ " holes

HEXAGON BROACHES — $\frac{1}{8}$ " to $\frac{3}{4}$ " holes

ROUND BROACHES — $\frac{1}{4}$ " to 1" holes

SEND FOR CATALOG
AND PRICE LIST

The duMont Corp.
Greenfield, Mass.

MAIL FREE BROACH CATALOG AND
PRICE LIST S describing Square Broaches,
Hexagon Broaches, Production Type Keyway
Broaches and Keyway Broach Kits to

Name.....

Company.....

Address.....

duMont

For more data circle 362 on Postpaid Card

56 modern machine shop

Meetings

Important Meeting

Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

JULY 13-15 • Truck-Trailer Manufacturers Association, Semi-Annual Meeting, Homestead Hotel, Hot Springs, Va. Association headquarters: 710 Albee Bldg., Washington 5, D. C.

JULY 29-AUGUST 1 • National Tool and Die Manufacturers Association, Summer Board Meeting, Grand Hotel, Mackinac Island, Mich. Association headquarters: 907 Public Square Bldg., Cleveland 13, Ohio.

AUGUST 10-13 • Society of Automotive Engineers, National West Coast Meeting, Hotel Georgia, Vancouver, B. C. Society headquarters: 485 Lexington Ave., New York 17, New York.

AUGUST 19-22 • American Institute of Electrical Engineers, Summer General Meeting, Sacramento, Calif. Institute headquarters: 33 W. 39th St., New York 18, New York.

SEPTEMBER 13-17 • Pressed Metal Institute, Annual Meeting, Stanley Hotel, Estes Park, Colo. Institute headquarters: 3673 Lee Rd., Cleveland 20, Ohio.

SEPTEMBER 14-17 • Society of Automotive Engineers, National Farm, Construction and Industrial Machinery Meeting, Production Forum and Display, Milwaukee Auditorium, Milwaukee. Society headquarters: 485 Lexington Ave., New York 17, New York.

SEPTEMBER 16-17 • American Die Casting Institute, Annual Meeting, Edgewater Beach Hotel, Chicago. Institute headquarters: 366 Madison Ave., New York 17, New York.

SEPTEMBER 21-22 • Steel Founders' Society of America, Fall Meeting, Homestead Hotel, Hot Springs, Va. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

SEPTEMBER 21-25 • Instrument Society of America, Instrument-Automation Conference and Exhibit, International Amphitheatre, Chicago. Society headquarters: 313 Sixth St., Pittsburgh 22, Pennsylvania.

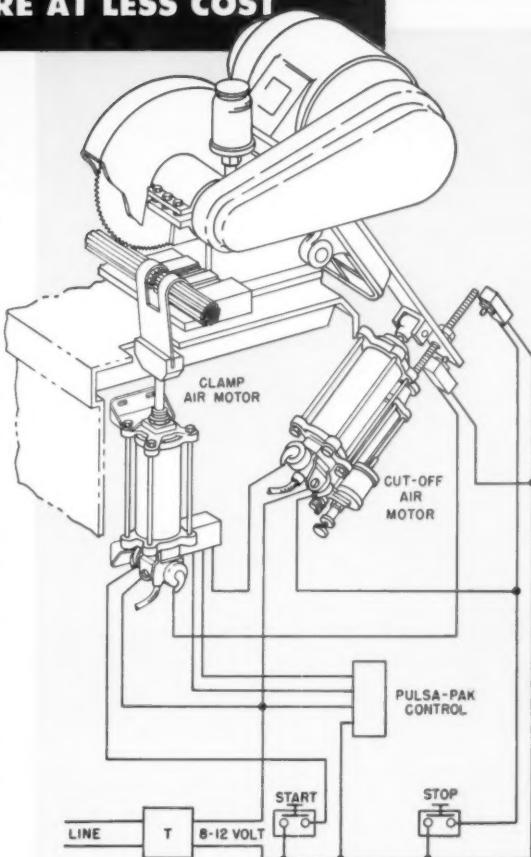
July, 1959

HOW TO MAKE A CUT-OFF SAW PRODUCE MORE AT LESS COST

Shown at the right is a SPOT-A-MATION IDEA used in many plants. Almost invariably it has meant cost savings of 50% or more—has improved product quality, lengthened saw life, lessened worker fatigue.

Two Bellows Air Motors are used. One, hydraulically controlled, feeds the saw through the work. The second clamps the work in position. The two Air Motors are electrically interlocked. The cut-off saw can be made completely automatic by adding a third Air Motor to feed the material.

This is another typical way Bellows Air Motors are used to "Spot Modernize" existing equipment. Almost any hand fed, or hand-controlled machine can be made to produce more, at less cost, with versatile Bellows "Controlled-Air-Power" Devices.



THIS SPOT-A-MATION
IDEA FILE IS
YOURS ON REQUEST

Contains drawings, circuit diagrams, equipment list, and full details to enable you to convert existing equipment to lower cost operation. Write for it today. No obligation. Address Dept. MMS-759, The Bellows Co., Akron 9, Ohio.

1285-B

OTHER INDUSTRIAL DIVISIONS OF
IBEC: Sinclair-Collins Valve Co.,
Valvair, Akron, Ohio • V. D.
Anderson Co., Cleveland, Ohio

The Bellows Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 9, OHIO

For more data circle 363 on Postpaid Card



*The wheels
industry
forgets...*

*Norton
remembers*

Industry forgets that, thanks to all-around usefulness, general purpose grinding wheels deserve as much care in selection as special purpose wheels.

They deserve the same care in manufacture, which Norton always remembers to give them. Like all Norton wheels, 44 ALUNDUM* general purpose wheels are made of virgin abrasive to precision limits . . . in the newest, most modern abrasive plant . . . with the same thorough control of processing and testing for safety.

For *your* benefit, this manufacturing care provides wheel balance, uniformity of structure and freedom from soft spots that result in free-cutting action throughout each wheel's entire life.

With huge stocks in Norton warehouses and plants to draw from, your Norton Distributors everywhere, keep full stocks for prompt deliveries. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries



W-1928

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electro-Chemicals

BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

For more data circle 364 on Postpaid Card

JOHANSSON GAGING EQUIPMENT

**Assures You
Precision to the
Finest Degree
to Meet Your
Requirements
—Backed by the
Name Supreme
in the World of
Measurement**

GAGE BLOCKS

(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

INTERNAL INDICATORS

(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

MIKROKATOR

(Amplifier—for outside measurements) Graduations .0001 to .000001 or .01M to .0002M.

OTHER JOHANSSON PRODUCTS

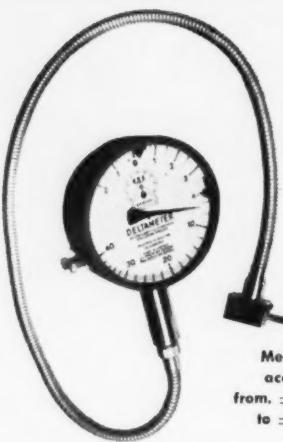
Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.

Write for Literature

C. E. JOHANSSON GAGE CO.

A DIVISION OF SWEDISH GAGE CO.

10641 HAGGERTY AVE. • BOX 4086 NORTHEASTERN STATION • DEARBORN 1, MICH.
For more data circle 365 on Postpaid Card



Measuring accuracy:
from $\pm .000,005''$
to $\pm .000,1''$

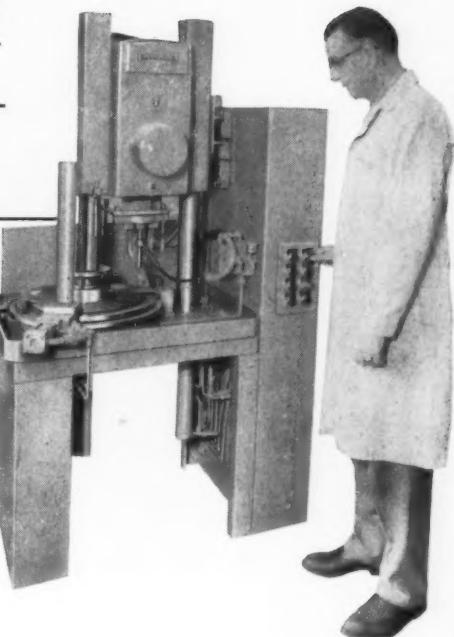
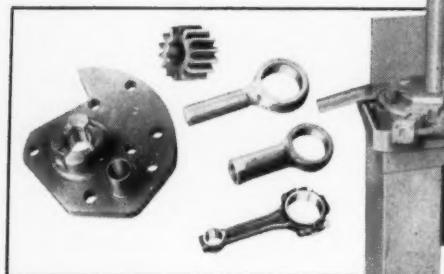
CEJ - DELTAMETER For Automatic Sizing

This pneumatic measuring instrument is intended for automatic machine control and for sorting of mass produced parts.

With the application of the CEJ-DELTAMETER to your machines you will get more accurate and uniform products...less rejected parts...less inspection as parts are already inspected when leaving machine. The CEJ-DELTAMETERS are applicable to such machines as ID- and OD-grinders, Turret Lathes and Rolling Mills as well as Sorting devices and many other special built machines and measuring fixtures. There are four different types of Gage Heads available. The Type I when adapted to an Internal Grinding Machine can automatically control the grinding operation to size of the part and even dress the grinding wheel before the finish grinding. When the part is ground to size the machine is automatically cut out. Other types are A, O and S applicable on turret lathes, O.D. grinders and for special applications.

HONE SMALL PARTS AUTOMATICALLY

High Production or Short Runs—
with bores up to 1-1/2"



This new No. 10 series of Single Spindle Vertical Honing Machines is designed with complete automation for handling small parts with bores up to 1½". These machines are small and compact in size, highly accurate, and simple to operate. They are particularly efficient and economical for honing short production runs, as well as sustained high production work.

Design features include pneumatic hone expansion with automatic rapid expansion, feed and collapse of stones; automatic bore-to-bore sizing; magazine loading and automatic ejection. Automatic shut-down is also pro-

vided as honing stones become worn. Optionally, parts may also be automatically pre-gauged, honed, post-gauged, sorted and ejected.

Powered by an all mechanical system, these machines require very little maintenance. Rigidity and accuracy are assured through suspension of the reciprocating head between two columns.

For free estimates and complete information on application to your high-production small-part finishing operations, send blueprints to Barnesdrill engineers.



BARNES DRILL CO.

860 CHESTNUT STREET • ROCKFORD, ILLINOIS
DETROIT OFFICE: 13121 Puritan Avenue

For more data circle 366 on Postpaid Card

modernize with Famco mills...



Model 200 (2 H.P.)



Model 100 (1 1/2 H.P.)

... THE MILL THAT GIVES YOU POWER FEED TO THE KNEE

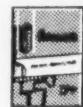
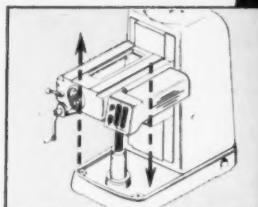
The only line of milling machines in this capacity range that incorporates power feed in 3 directions—knee, table and saddle.

This Famco exclusive enables you to reduce operator fatigue and increase workmanship.

Besides, with power feed to the knee, you are assured of greater milling accuracy and versatility. This feature permits deeper more precise boring without any possibility of tool run-out.

If you want a rugged precision-built mill find out about the top quality Famco Mill line today.

Send for the Famco Milling Machine Catalog now.



f a m c o

machine company

3122 Sheridan Road • Kenosha 7, Wisconsin

PRESSES... AIR, ARBOR, POWER, FOOT

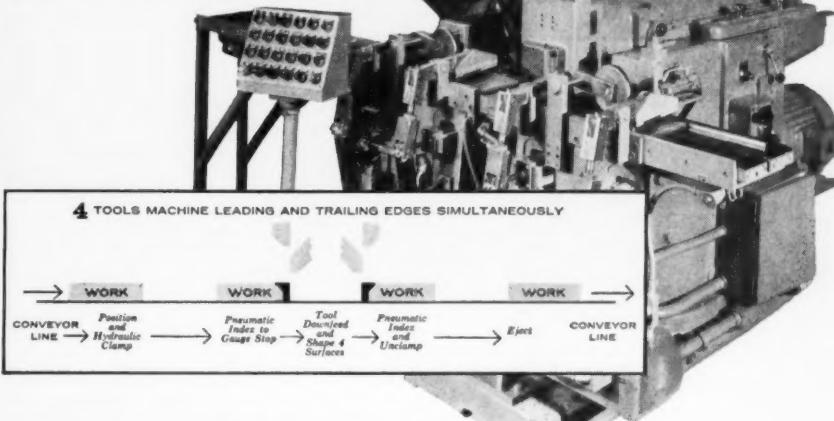
SQUARING SHEARS, MILLING MACHINES, BAND SAWS

For more data circle 367 on Postpaid Card

Now... automation comes to shaping!

Full Automatic Cycling

For Conveyor-Line Operation



On New Rockford Hy-Draulic Shaper

Believed to be the first automatic shaper built, this standard 24" shaper with special tool head and cross-rail has been adapted to conveyor-line operation by arranging completely automatic cycling, including loading and unloading.

With this new method, many types of flat plates may be machined accurately and efficiently at high production rates, saving costly cutting tools and extra fixturing expense.

Four standard high speed steel tool bits with identical grinds are used to finish one vertical and one angular surface of each of 2 pieces simultaneously, as shown in diagrammatic sketch of the automatic cycle. The machine features pneumatic index, hydraulic positioning and clamping, and positive mechanical feed. Operation is continuous until machine is stopped by operator, or automatic safety devices reject the cycle sequence.

This type of automatic machining has many variations, using Rockford Hy-Draulic Shapers. If you have high output requirements for work which lends itself to this type of machining, send us blueprints for estimates and recommendations.



ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

For more data circle 368 on Postpaid Card

New:

Hanson-Whitney's new production techniques give you *consistent* quality cutting edges with "free-cutting action" for increased productivity. These advances in Hanson-Whitney standard cutting tools mean longer tool life — uniform size and less binding. And you protect your threading investment from start to finish, with Hanson-Whitney's *related* line of standard Thread Gages — keeps your profit dollars up, where they ought to be.

*Complete and Related
"STANDARDS"*

Your Hanson-Whitney distributor puts a *complete and related* line of standard "free-cutting action" tools and gages at your finger tips. He is your threading specialist backed up by Hanson-Whitney's forty years of thread engineering and experience. Call him now.



Hanson-Whitney COMPANY

204AC BARTHOLOMEW AVE., HARTFORD, CONN.

STANDARD: Taps • Thread Gages • Cutters • Fine Pitch Gear Hob

For more data circle 369 on Postpaid Card

BRAND NEW!

**SANFORD MG GRINDER
and DUST COLLECTOR
in a SINGLE COMPACT
UNIT**

**MG GRINDER ALSO AVAILABLE FOR
DRY OR WET GRINDING
WITHOUT DUST COLLECTOR**

The most widely used precision machine for unit grinding. Famous for its unsurpassed workmanship, quality and vibration-less operation. The MG is the grinder that's been "copied" but never equaled.

PARTIAL SPECIFICATIONS

GRINDER: CAPACITY — 8" x 12" x 12". TABLE TRAVEL — 13", TRANSVERSE 8 3/4". VERTICAL CLEARANCE — 12" under 7" wheel. STANDARD GRINDING WHEEL — 7" x 1/2" x 1 1/4" hole. SPINDLE SPEED — 3000 RPM. MOTOR — 1/2 HP, single or 3 phase. TEBB dynamically balanced.

FLOOR SPACE — 45" x 38", 62" high on floor stand. NET WEIGHT — 600 lbs.

DUST COLLECTOR: BUILT INTO GRINDER FLOOR STAND. EXHAUST CAPACITY — 650 CFM. MOTOR — 1/2 HP, 3450 RPM, single or 3 phase. NET WEIGHT — 140 lbs.

A
**COMPLETE
DUST COLLECTOR
INCORPORATED INTO
GRINDER STAND.**

- Exclusive design exhaust hood catches all sparks.
- Can be wired to grinder starter.
- Uses standard size filters—renewable or disposable type, or a combination of both.
- No outside exhaust needed.
- Saves floor space.
- Full size rear door gives access for cleanout.

SANFORD

MANUFACTURING CORP.
1026 Commerce Ave., Union, N. J.

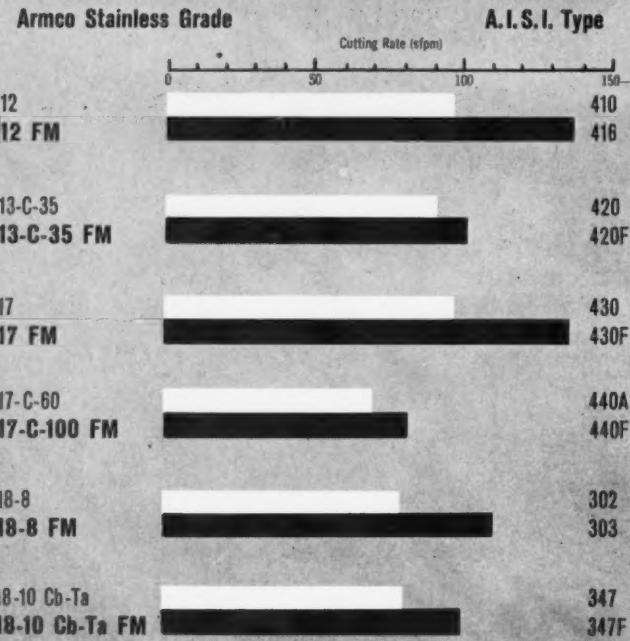
For more data circle 370 on Postpaid Card

July, 1959

modern machine shop 65

How Armco Free-Machining Stainless Steels help you cut costs

Just check these improved cutting rates



These automatic screw machine speeds indicate the increased machinability you can usually expect from the six most popular of Armco's 12 free-machining stainless steels. Their faster cutting rates mean higher production, lower costs. Contact your nearby Armco Distributor for complete information on the wide range of grades, sizes, and shapes available, or write Armco Steel Corporation, 2499 Curtis Street, Middletown, Ohio.

New steels are
born at
Armco

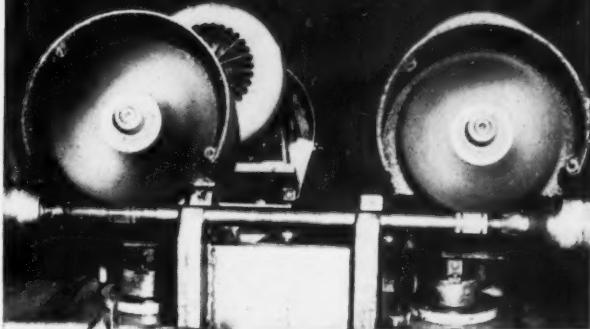
ARMCO STEEL



Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation
• Union Wire Rope Corporation • Southwest Steel Products

For more data circle 371 on Postpaid Card

FINISHING Operation...



MAIN SHAFT FOR AUTOMATIC TRANSMISSION

is finished fast . . . at low cost on this Osborn Power Brushing setup. In seconds —two brushing heads, using Osborn Economy® wire brushes, oscillate back and forth and reverse direction to remove burrs and heat treat scale from splines at each end of the shaft. Brushing job is thorough and efficient to help assure trouble-free shaft performance.

IN SECONDS with OSBORN Power Brushing

What's your production problem—higher volume . . . lower-cost output . . . better quality control? These are only some of the important basic problems you can easily solve—at low investment—with today's Osborn Power Brushing methods.

And you can *count* on the results—because over 67 years of experience means Osborn can engineer and apply the most efficient *power brushing techniques* for your specific jobs . . . your special problems.

The first step is an **Osborn Brushing Analysis**. Here—your Osborn field engineer can single out immediate savings on your operations that involve deburring, cleaning, precision blending—or finishing methods of essentially every description. For details—write *The Osborn Manufacturing Company, Dept. B-23, Cleveland 14, Ohio.*



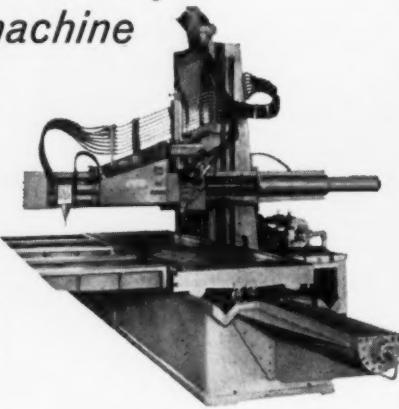
POWER, PAINT AND MAINTENANCE
BRUSHES • BRUSHING METHODS
BRUSHING MACHINES • FOUNDRY
PRODUCTION MACHINERY

For more data circle 372 on Postpaid Card

Osborn Brushes

NOW **SYNCHRO-TRACE***

*can be applied to your
milling machine*



***SYNCHRO-TRACE**-*the fully automatic 3D programmed control system that cuts cost of dies, molds, and contoured parts by over 50%.*

Yes—Now your toolroom, production, or planer type milling machine can be equipped with Synchro-Trace automatic duplicating control—and the result—greatly increased profits per machine.

Fully automatic operation of Synchro-Trace allows the operator, formerly required, to perform other important duties. Better machine finish means up to 50% less time required for hand finishing. Any shape of part may be duplicated—even 90° walls—and with greater accuracy.

For full information on adapting your machine to Synchro-Trace fully automatic 3D duplicating, consult your nearest True-Trace distributor or direct factory branch plant—TODAY. Synchro-Trace may also be purchased as original equipment on new milling machines.

For complete data write for new illustrated brochure #STM-1 today. Dept. MM2.



TRUE-TRACE

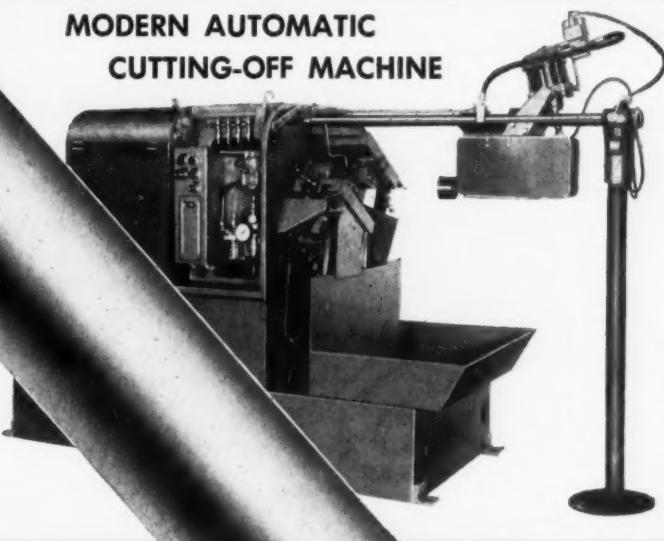
® SALES CORP.

9830 Rush Street, El Monte, California

Branch Plants: 35 Urban Avenue, Westbury, Long Island, New York
2401 Eaton Lane, Racine, Wisconsin

For more data circle 373 on Postpaid Card

MODERN AUTOMATIC CUTTING-OFF MACHINE



Fast cut-off in lengths from a fraction of an inch to several feet with micrometer accuracy. Handles any length of stock and cuts any material that can be turned—bar stock up to 3" O.D.—tubing up to 8" O.D. Will cut-off, form, groove, flange and chamfer in a single operation—at a high rate of speed.

**CUTS TUBING,
PIPE AND
BAR STOCK
FAST**



WRITE for CATALOG

Describes all models. Complete specifications. Shows automatic bar feeder that handles entire load of stock with no operator attention, even with random lengths. Also, hot spinning machines and Safety Drill Tables.



103

MODERN MACHINE TOOL COMPANY
JACKSON, MICHIGAN

For more data circle 374 on Postpaid Card

July, 1959

modern machine shop 69

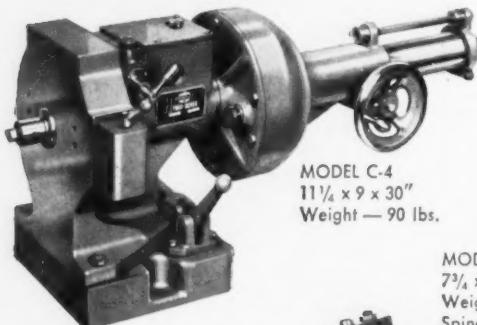


GREENLEE HYDRO-BORERS

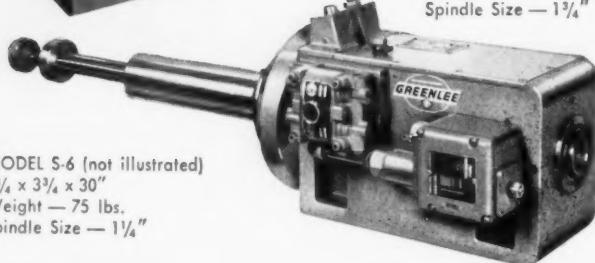
Low cost precision boring

Patented oil displacement feed principle assures high quality finish. Compact design.

Ideal for mounting in any position on work-holding fixtures, assembly jigs, etc. Simplifies production setups. Three models to meet all your requirements. Write today for further information.



MODEL C-4
11 1/4 x 9 x 30"
Weight — 90 lbs.



MODEL S-7
7 1/4 x 5 1/2 x 34 1/2"
Weight — 135 lbs.
Spindle Size — 1 1/4"

MODEL S-6 (not illustrated)
6 3/4 x 3 3/4 x 30"
Weight — 75 lbs.
Spindle Size — 1 1/4"

GREENLEE BROS. & CO.

1794 MASON AVENUE
Rockford, Illinois



For more data circle 375 on Postpaid Card

For fast, economical cutting of flat metal shapes there are

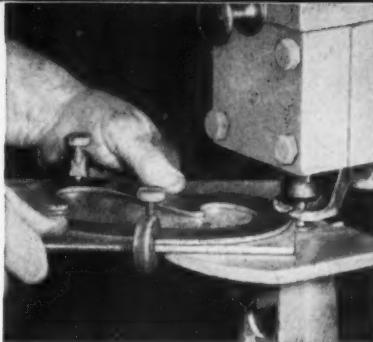
7 MODELS OF Campbell Nibbling Machines

...with cutting capacities ranging from $3/32"$ mild steel for MODEL 0 machine to $1/2"$ mild steel for MODEL 530, in sheet sizes from $16"$ or less, to $72"$.

CAMPBELL NIBBLERS are making tremendous savings in time and money for hundreds of users in aircraft and other metal-working plants.

...in fast cutting of ferrous and non-ferrous sheet metals or composition sheets.

...for moderate production runs or experimental development work.



Economical
"throw-away"
punch and die



Send for this
catalog for com-
plete information
on this versatile
production and
experimental tool

- CAMPBELL NIBBLERS cut from 40 to 60 times faster than drilling or filing. A fast-moving punch (350 to 900 strokes per minute) operating over a die, nibbles out the design, taking a small "bite" with each stroke of the punch.

- ...for any and all kinds of shapes

- ...for either inside or outside cuts

- ...with no distortion of material—no internal strains
—no invisible fractures—no burr

- ...with a "nibbled" edge that is sufficiently smooth
to require very little finishing and sometimes none

CAMPBELL standard punches are made double end to double work life and halve the cost. Prices are so low (starting at 40c each, or 20c per working end) that new punches cost less than regrinding dull ones.

Here is a quick picture of CAMPBELL NIBBLING MACHINE Capacities

Campbell Nibbler Model #	Sheet Width	WORKING CAPACITY		Strokes per Minute
		Mild Steel	Alloy Steel	
0.....	16"	$3/32"$	$1/16"$	900
1A.....	20"	$3/16"$	$1/8"$	375-650
430.....	60"	$3/8"$	$1/4"$	350-525
436.....	72"	$3/8"$	$1/4"$	350-525
530.....	60"	$1/2"$	$5/16"$	350-525
2524.....	48"	$1/4"$	$3/16"$	375-650
2536.....	72"	$1/4"$	$3/16"$	375-650

CAMPBELL NIBBLERS
Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

Dept. 931, 230 Park Avenue, New York 17, N. Y.

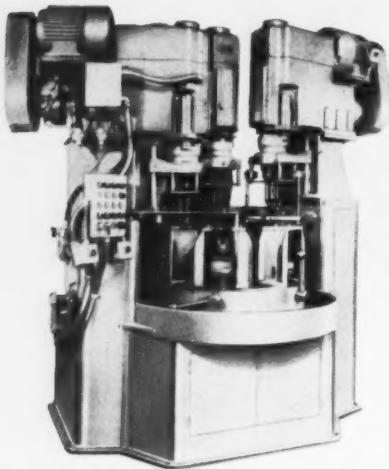
For more data circle 376 on Postpaid Card

July, 1959

modern machine shop 71



NEW KAUFMAN MODEL 10E-1125 TAPPING MACHINE



- For drilling, countersinking and tapping a wide variety of flanged valve bodies.
- Three-head machine provided with 7½ h.p. standard head units, four-spindle adjustable heads and five-division index.
- Head units provided with six-speed transmission, hydraulically operated adjustable feed, rapid advance and adjustable time delay at bottom of stroke.

Kaufman's new Model 10E-1125 handles a large range of flanged bodies with different diameter of drills, countersinks and taps on a variety of bolt circles — for example: four holes are completed in part at one time. Whether you need Model 10E-1125 or a machine with standard drilling or tapping head units, or a machine for a new, unusual job — see Kaufman!



Write or telephone for full information today!

KAUFMAN MFG. CO.

551 S. 29th St.

Manitowoc, Wis.

For more data circle 377 on Postpaid Card



Introducing the NEW MODEL 1-A SEVER-ALL Machine... CUTS AT 3 to 6 SECONDS PER SQUARE INCH—ECONOMICALLY

LOW COST • Priced at less than \$500, delivered.

BIG CAPACITY • Up to 2" square solids, 3½" o. d. pipe and tubing, 3" angle iron, and 4" channels. Wheel oscillation, an exclusive feature in this price range, provides this *above-average* capacity.

SPEED • Cuts a 2" x 2" hardened steel bar in 16 seconds . . . practically any metal at 3 to 6 seconds per square inch.

QUALITY • Clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting.

VERSATILITY • Cuts cold rolled, stainless, and alloyed steel; cast iron; and non-ferrous metals.

ECONOMY • Occupies minimum floor space . . . eliminates annealing costs . . . gives more cuts per wheel as a result of oscillation.

SIMPLICITY • Just two SEVER-ALL cutting wheel specifications will do *all* your SEVER-ALL cutting jobs. Little or no set-up time required.

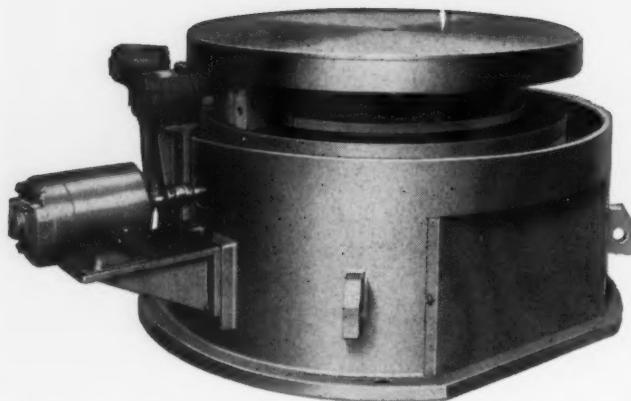
NEW SEVER-ALL AVAILABLE FROM DISTRIBUTORS

Very likely your own distributor already stocks the Model 1-A SEVER-ALL Abrasive Cutting Machine and Wheels. If not, we'll give you the name of your nearest SEVER-ALL distributor. We'll also be glad to send you complete details on this new machine. Just ask for Bulletin DH-106.

**ALLISON-CAMPBELL DIVISION
AMERICAN CHAIN & CABLE**

931 Connecticut Avenue, Bridgeport 2, Conn.
For more data circle 378 on Postpaid Card





drill varied hole patterns without changing set-up

If your drilling, tapping, or milling jobs require even, uneven, or skip indexing, this new Electrodex table will give you more flexibility than ever.

Set up your work piece just once on this table, and you can drill many different hole patterns. Changeover from one index pattern to another is fast. You can do it mechanically—with index rings or inexpensive templates—

or by push-button electrical counting.

Eight-channel numerical tape control is available. You get indexing accuracy to $\pm .001"$ at a 45" diameter. And you can choose your table size from 30", 45", 60", and 80" diameters.

Bulletin 258 gives complete details.

Avey Division, The Motch & Merryweather Machinery Co., Box No. 1264, Cincinnati 1, Ohio.

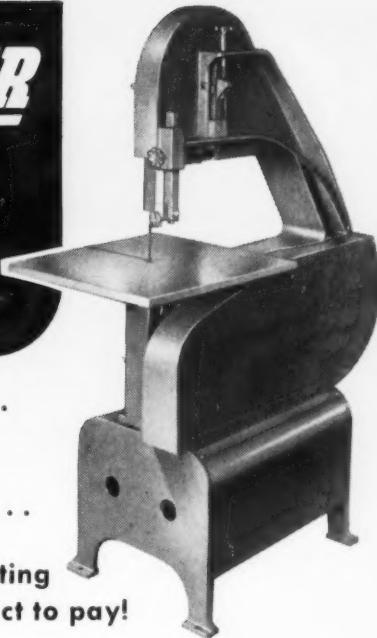


For more data circle 379 on Postpaid Card

LOCKFORMER

BAND SAW

- 24" throat without 24" bulk . . .
- Variable speeds without speed reducer power losses . . .
- Heavy-duty, production cutting at half the price you'd expect to pay!



Big enough for almost any sawing job, small enough to fit most anywhere, the Lockformer Band Saw's low cost makes it a practical and profitable investment for *any* shop. Blade speeds of 100, 600 and 3000 fpm give production speed cutting on wood, plastics, forgings, steel plate, non-ferrous metals and stainless steels. Ball bearings with neoprene seals, cemented carbide blade guides, friction-free and slip-proof chain for final drive and many other top-quality features.

THE LOCKFORMER co.

WRITE FOR
bulletin giving
full facts.

Dept. MS, 4615 West Roosevelt Road
Chicago 50, Illinois

In Canada: Brown Boggs Foundry & Machine Co., Ltd., Hamilton, Ontario
For more data circle 380 on Postpaid Card



Since 1865

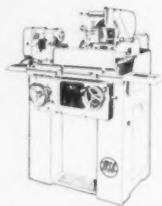
SOLVES Grinding Problems

This is the 94th consecutive year of MSO leadership in the development of improved grinding methods.

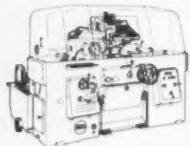
MSO offers unequalled precision in the most advanced grinding machines available anywhere. .

Today, when your grinding problems are more complex than ever before, MSO, as always is one step ahead with the solution.

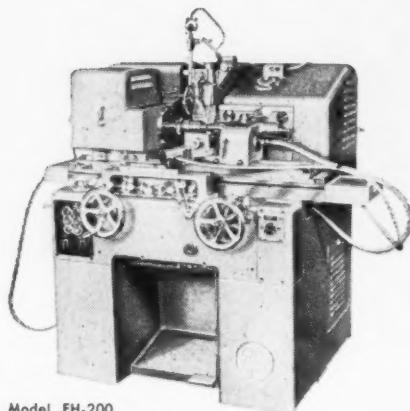
The MSO line comprises a full range of Plain and Universal Grinders, Cap. 7" x 12" to 22" x 138".



MODEL FMES
UNIVERSAL
GRINDER



MODEL GA-2
HYDRAULIC
THREAD GRINDER



Model FH-200
Hydraulic Production Grinder
Capacity: 10" x 16" to 40"

FEATURES:

- Rapid traverse to wheelhead
- Equipped for traverse and plunge-cut grinding
- Selection of 4 automatic cycles with fine finishing feed, adjustable spark-out and automatic cut-out
- Manual and automatic table and wheelhead movement
- Fine feed to .0001" by quick lever trip
- "Pneumatic" electric grinding gauge sizes to .0001"

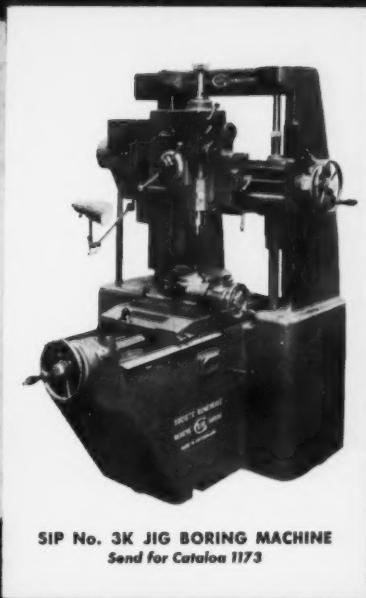


austin industrial corporation

76-n Mamaroneck Avenue

White Plains, New York

For more data circle 381 on Postpaid Card



SIP No. 3K JIG BORING MACHINE
Send for Catalogue 1173

Illustrated is the machining of a magnesium casting for an electronic unit . . . (A) drilling, boring and counterboring 37 holes, 62 diameters ranging from 0.255" to 5.125" . . . (B) drilling, boring and counterboring 11 holes, 16 diameters ranging from 0.100" to 0.787". Here's the record:

MACHINING TIME (A).....8 HOURS, 15 MINUTES

MACHINING TIME (B).....2 HOURS, 0 MINUTES

How's that for Production!



The machine that does it is the SIP No. 3K Jig Boring Machine. It has what it takes—ease of operation, increased generous range and capacity, plus the basic Precision that is SIP—to finish critically sensitive jobs like this so fast and so well! SIP quality and precision cost you no more.



makes Precision Production Practical & Profitable

AMERICAN SIP CORPORATION

100 EAST 42nd STREET, NEW YORK 17, N. Y.

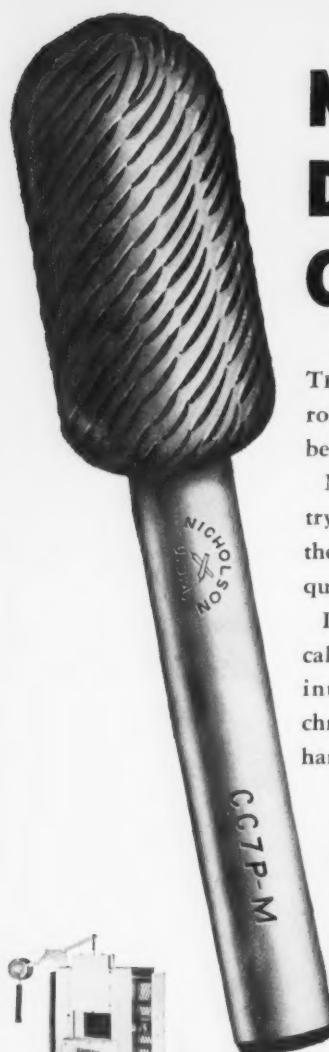
*and how's this for
Accuracy?*

HOLE DIAMETERS HELD TO
+0.0004", -0

CENTER DISTANCES HELD TO
+0.00025", -0

Since 1926 all SIP Machines delivered to U.S.A. and Canada have been calibrated in the INTERNATIONAL INCH [1" = 25.4 mm].

For more data circle 382 on Postpaid Card



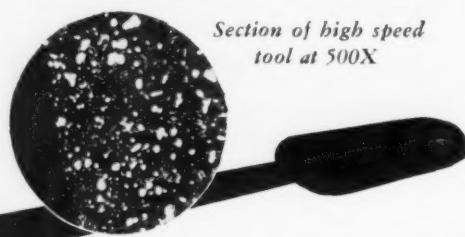
Nicholson Demands Clean Hardening!

THE SHARP EDGES of the chisel-cut high speed rotary file shown here are formed by impact before hardening.

Nicholson File Company relies on the Sentry Diamond Block Atmosphere to retain these critical edges on their endless variety of quality, high speed rotary tools.

In the neutral Sentry atmosphere, automatically generated within the furnace chamber, intricate high speed or high carbon high chrome tools may be soaked for true "file" hardness without danger of surface spoilage.

Section of high speed tool at 500X



A demonstration of hardening on your own tools will convince you of Sentry benefits. Why not send us samples?



Sentry

ELECTRIC
FURNACES

TRADEMARK

270-9

Request Catalog M-12 • Write THE SENTRY CO., FOXBORO, MASS.

For more data circle 383 on Postpaid Card

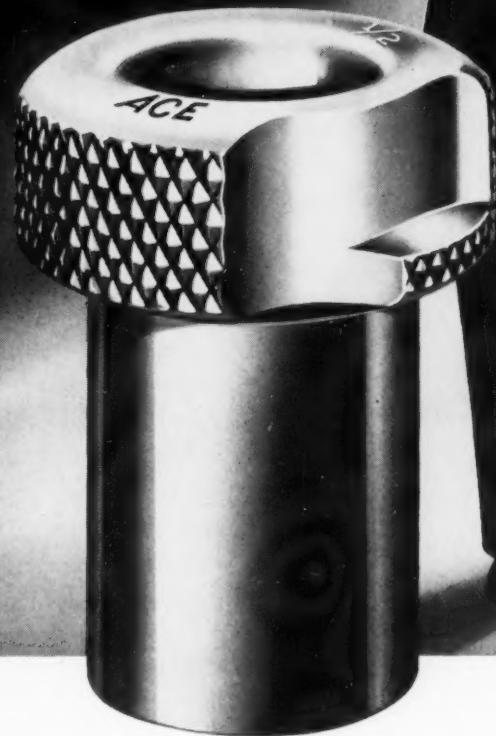
78 modern machine shop

July, 1959

For more data on advertisement on opposite page,
circle 384 on Postpaid Card →

THIS IS AN **ACE** DRILL BUSHING

the one that outwears and outperforms!



IT'S GRATIFYING TO KNOW YOU MAKE THE BEST!

The man who makes Ace Drill Bushings is no Johnny-come-lately. He's not a novice. His bushings last a long, long time. That makes them cost you less.

He cares about quality. Some say it doesn't pay to build stuff too good . . . just get by . . . imply that engineers don't know the difference, but they're wrong. The man who makes Ace Drill Bushings doesn't buy that line.

He makes the best. Doesn't have to offer excuses or alibis. Doesn't have to dodge his customers; they're his friends. He saves them lots of money. He backs every claim with controlled quality . . . His Drill Bushings are consistent — every one the same — you can depend on them.

He sleeps well at night, too — every night — year after year. His customers are happy. He doesn't worry about competition — just goes right on making the very best drill bushings — rolling up bigger and bigger sales.

We're talking about ACE — the DRILL BUSHINGS that are superior. *Try them. You'll see.*

STOCKED, FOR IMMEDIATE DELIVERY BY LEADING TOOLING SPECIALISTS IN YOUR COMMUNITY.

ACE DRILL BUSHINGS

NEW JERSEY
611 McCarter Highway
NEWARK 2 Mitchell 2-3006



HOME OFFICE
CALIFORNIA
5407 Fountain Ave.
LOS ANGELES 29 HO 9-8253



MICHIGAN
10620 West Nine Mile Road
DETROIT 37 Lincoln 8-0777

NEW! BOKUMATIC RECESS TOOL HOLDER

A new standard automatic recessing tool holder has been introduced by Bokum Tool Company. Designed to accommodate Bokum standard "O" ring, retaining ring, back chamfering and thread relief cutting tools, the tool holder features a double cam action for chatter-free, precision operation. It can be used on standard drill presses, radial drills, turret lathes and chucking machines. Write for complete information.



BOKUM TOOL COMPANY, INC.



14775 WILDEMERE AVENUE
DETROIT 38, MICHIGAN



For more data circle 385 on Postpaid Card



NEW IDEA

IMPROVES
COLD-FORMING TAPPING

JARVIS PRESENTS NEW JAR-FLO TAPS FOR CHIPLESS FORMING (INSTEAD OF CUTTING) OF THREADS IN THRU OR BLIND HOLES

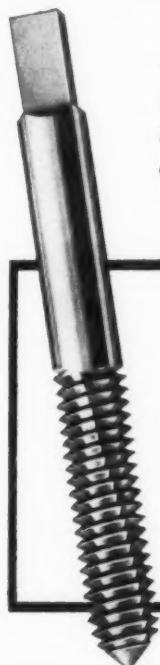


*EXCLUSIVELY **JAR-FLO**

Unique design with lobes, or pressure contact points, gives true geometrical contact. Lobes are generated on Helical Ground Threads to give progressive working of metal and smooth burnished finish.

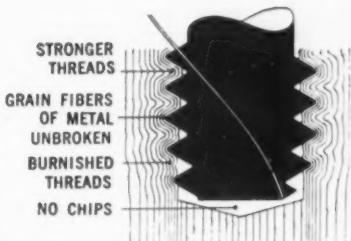
JAR-FLO ADVANTAGES

1. NO CHIPS
2. FASTER TAPPING CYCLES
3. HIGHER TAPPING SPEEDS
4. LESS DANGER OF BREAKAGE IN TAPPING BLIND HOLES CAUSED BY CHIP INTERFERENCE.
5. LONGER TAP LIFE REDUCES COSTS
6. ELIMINATES SHAVED AND OVERSIZED THREADS



JAR-FLO TAPS FOR

ALUMINUM	ZINC—LEAD
MAGNESIUM	LEADED STEELS
COPPER—BRASS	DIE CASTINGS
& OTHER DUCTILE METALS	



HELICAL FORMING THREADS
(FORMS THREADS WITHOUT CUTTING)



JARVIS CORPORATION

Middletown, Connecticut



SEND COUPON TODAY FOR PROMPT DETAILS

JARVIS CORPORATION
101 Pease Ave., Middletown, Connecticut

Have Rep. call Send brochure, prices

Name Title
Company
Street
City State

For more data circle 386 on Postpaid Card

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW



How Allison Wheels help you get Quick, accurate cuts on almost any material or shape

• Abrasive cutting can give you *cleaner* cuts, *faster*—on almost any material from titanium to fire brick. But only with the proper cut-off wheel can you get best results. That's where your ALLISON-CAMPBELL Field Engineer can help. He can select the ALLISON wheel to cut metals and other hard materials at speeds of just a few seconds per square inch—fine finish, no burn, with little or no burr—accuracy within close tolerances. There's an ALLISON wheel for every abrasive cutting job.

Resinoid bonded wheels • for dry abrasive cutting at speeds of 3 to 5 seconds per sq. in.
Rubber bonded wheels • for wet cutting of

all types of steel, alloys, titanium, glass, plastics. **Masonry cutting blades, including reinforced types** • for wet and dry cutting of fire brick, concrete block, tile, other building materials. **Fiberglass reinforced wheels** • for extra strength on many foundry jobs.

GET THE COMPLETE STORY! • Write for Bulletin DH-214 for detailed information on abrasive cutting and wide selection of ALLISON wheel specifications. ALLISON wheels available 3" to 34" diameter, .006" to 3/16" thick. And remember—your ALLISON-CAMPBELL Field Engineer can give you specialized help. Specify ALLISON wheels for efficient, accurate, economical cutting.

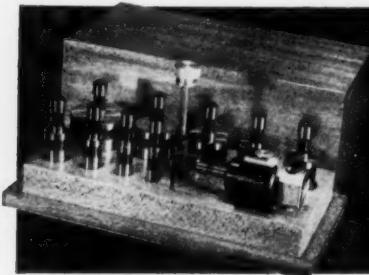


ALLISON ABRASIVE CUTTING WHEELS

Allison-Campbell Division • American Chain & Cable Company, Inc.
931 Connecticut Avenue, Bridgeport 2, Conn.

For more data circle 387 on Postpaid Card

take the guess-work out of Profiling!



with an
Adjustable
STYLUS HOLDER

DEFLECTION PROBLEM SOLVED

Compensate for any amount of deflection with a simple, quick adjustment.

MINIMUM DOWN TIME

Eliminate search for matching cutter and stylus. Select cutter, then adjust holder to proper size.

CUTTER COST REDUCED

Prolong cutter life—regrind to sharpen only—size is no factor. Any size cutter performs equally well as new one.

GREATER ACCURACY

Accuracy no longer depends on finding stylus and cutter of exact size. The micrometer screw in the adjustable stylus holder permits controlled stock removal.

MINIMUM STYLII REQUIRED

Nine stylii do work of 70 to 100. In 3 dimensional work, when cutter change is required, stylus need not be replaced.

TEMPLATE ERRORS CORRECTED

These discrepancies in template can often be "adjusted out" while cutter is in motion.

9 Stylii will
cover
complete
work range

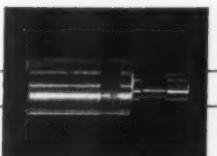
9



70

70 or more
stylii
formerly
required for
complete
work range

CRITERION
TOOL  PRODUCTS



CRITERION MACHINE WORKS

765 WEST SIXTEENTH STREET
COSTA MESA, CALIFORNIA

For more data circle 388 on Postpaid Card



MODERN BRIGHTBOY ABRASIVES

Replace older, costlier metalworking methods

Looking for cost savings? Improved product-quality? Simpler, faster production procedures? The many applications of Brightboy, the different finishing medium, will give you a broad, refreshing concept of metal working not usually associated with the scope of abrasives.

REASON: Brightboy's compound—abrasive and rubber, working together in a unique action. Brightboy BURRS, CLEANS, FINISHES, POLISHES, in a single-step, time saving operation, frequently producing the final polish. Special surface effects, damaskeening,

Write Us NOW for:

- SAMPLE BRIGHTBOY HAND TABLET
- CATALOG LISTING GRAINS, TEXTURES, MACHINE SPEEDS
- NEW METHOD RECOMMENDATIONS and name of nearest Brightboy distributor



for instance, also can be achieved. *No fuss, no muss!*

Readily-available Brightboy STOCK numbers are JOB-MATCHED to your work to eliminate your need for special compounds. You have wide choice in Silicon Carbide and Aluminum Oxide grains, grades extra fine to extra coarse, in soft, firm and tough rubber binders. Wheels, sticks, rods and blocks for machine and manual operations.

TIME SAVING FEATURES

Works to close tolerances

Can be shaped to contour

Produces conventional and special finishes and patterns, frequently the final polish
No before-use preparation or dressing

No skilled labor required

GENERAL USES

Removing light digs, tool and heat marks

Cleaning welded and soldered joints

Burring and finishing castings, stampings, machined and molded parts

Maintenance of tools and machinery

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.

95 North 13th Street • Newark 7, N. J.

*America's Pioneer Manufacturer
of Rubber-Bonded Abrasives*

For more data circle 389 on Postpaid Card

IT HAS **QUALITIES** YOU WANT

Bunting[®]

Alcoa Aluminum Bars

BUNTING
BEARING ALUMINUM
offers improved quality
over low priced Bronze Bars
and at a comparable price.
It possesses the important
qualities which make a good sleeve
bearing material, namely:

- Good heat conductivity
- Excellent embedability
- Good ductility
- High load-carrying capacity
- High resistance to corrosion
- Conformability to the shaft
- Good fatigue strength

Your Bunting distributor now has in stock 138 sizes
of 13" tubular and solid Bunting Bearing Aluminum
Bars. Write or ask for catalog and literature.

**Other Products Available
from Your Bunting Distributor**

866 stock sizes of Bunting Cast Bronze Bearings and
267 sizes of Bunting Cast Bronze 13" Bars.

667 sizes of Bunting Sintered Oil-filled Bronze Plain,
Flange and Thrust bearings and 84 sizes of
Sintered Bronze 6½" Bars. Ask for Catalog 58.

343 sizes of Bunting Cast Bronze Electric Motor
Bearings for all motors. Ask for Catalog 258.



Bunting

BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS
OF CAST BRONZE OR SINTERED METALS.
ALCOA[®] ALUMINUM BARS.

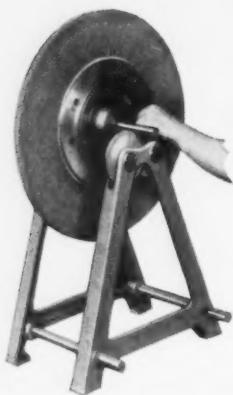
The Bunting Brass and Bronze Company, Toledo 1, Ohio
Branches in Principal Cities

Copyright 1958 by The Bunting Brass and Bronze Co., Toledo, O.

For more data circle 390 on Postpaid Card

ASK HIM
Your Bunting distributor is listed in the
classified section of your telephone
directory usually under
Bears-Bronze and
Bearings-Bronze.

Balance...



ROTATING PARTS

Faster...Easier

Supersensitive Anderson Balancing Ways will static-balance rotating parts easier, faster, more accurately. No setup, no leveling, no centering. Glass-hard spindles and bearings prevent wear or ball-bearing indentations when balancing heavy work. Superior accuracy lasts throughout long life. Proved and preferred over 40 years.

Anderson **HAND SCRAPERS**

Anderson Hand Scrapers are: (1) faster cutting, (2) easier to use, (3) just the right spring, (4) palm fitting grip, (5) 18"-20"-22" lengths. Saves costly regrinding.

\$6.75 (18") with high speed blades

\$9.85 (18") with carbide-tipped blades

\$1.75 for rubber bumper shown below

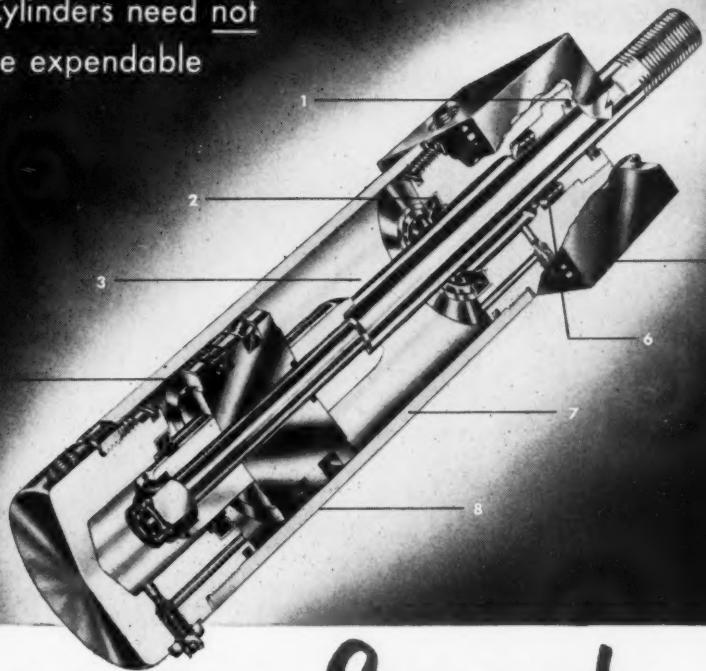


Write for Bulletin 6-5

**ANDERSON BROS.
MFG. CO.
Rockford, Illinois**

For more data circle 391 on Postpaid Card

Cylinders need not
be expendable



Specify the **T-J Spacemaker**
for longer, more efficient cylinder service

You too—can reduce replacement expenditures—lower maintenance costs with the T-J Spacemaker cylinder line. Designed and engineered for ruggedness, and accuracy of operation, the Spacemaker assures longer, uninterrupted operation.

The T-J Spacemaker eliminates tie-rods, gives greater strength, saves space . . . and reduces costs in all push-pull operations. Immediate delivery in a complete range of styles and capacities . . . air or oil. Write for Bulletin SM 155-4, today. The Tomkins-Johnson Company, Jackson, Michigan.

WITH EXTRAS . . . AT NO EXTRA COST

1. METAL PISTON ROD SCRAPER—protects rod packing, cylinder bore and rod surface by removing all foreign particles.
2. NEW "SUPER" CUSHION for air or METALLIC SELF-ALIGNING MASTER CUSHION for oil.
3. HARD CHROME PLATED CYLINDER BORES AND PISTON RODS for greater protection, reduced wear.
4. ONE PIECE PISTON assures better alignment, longer bearing and packing life.
5. FORGED SOLID STEEL HEADS throughout entire line.
6. PILOTED PACKING GLAND with extra long bearing for additional strength and support to piston rod.
7. NO TIE-RODS TO STRETCH—gives you 360° port rotation . . . less space used . . . full strength.
8. STREAMLINED DESIGN . . . operating pressures to 200 PSI, air; 1,000 PSI oil, non-shock.



TOMKINS-JOHNSON

For more data circle 392 on Postpaid Card



when will this cutter need GRINDING?

When the blades get dull, of course.

But when is a cutter blade dull? At what degree of dullness does it begin to consume increasingly more horsepower and produce inferior finish? At what point does grinding prolong blade life?

Knowing exactly when to grind cutters is just one of the many variables that vitally affect performance and costs.

Our specialty is working with these variables—to furnish the most economical

solutions to milling and boring problems, including grinding techniques, through the use of inserted blade cutters.

We study machine, work piece, feed rate, depth of cut, speed and finish requirements. And only after pooling this information with the customer's specialized knowledge of his own work is any cutter recommended.

We would appreciate the opportunity to tell you more about this unique cutter selection service. Write:

For more data circle 393 on Postpaid Card

This helpful new booklet tells you how to reduce the cost of chips and improve your milling and boring performance. Ask for a free copy of booklet No. 684.



THE
INGERSOLL
MILLING MACHINE COMPANY
CUTTER DIVISION
505 FULTON AVENUE • ROCKFORD, ILLINOIS

NEW RANGE OF SIZES

DiaTest

HIGH PRECISION

SMALL BORE GAGE

- RANGE: .057" to 1.130"
- 4 SETS, fully equipped with rings and measuring heads.
- READINGS IN .0001"
- ACCURACY TO .00008"

DiaTest checks out-of-round, tapers, incomplete bores and all other variations. All sets overlap in size for complete range.

All parts available separately.

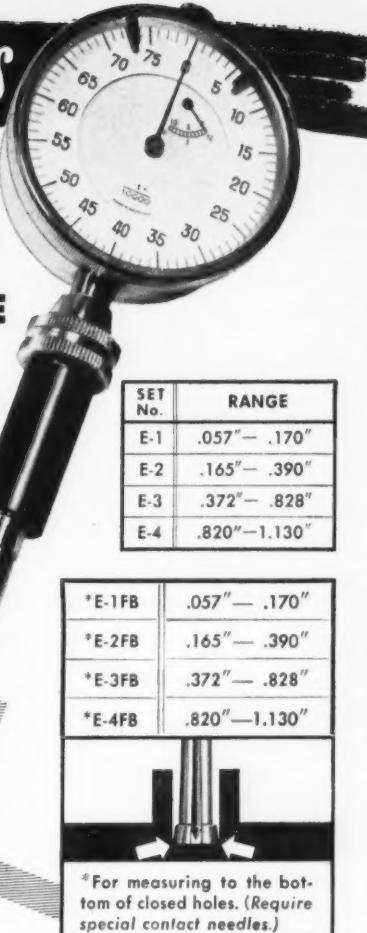
EACH SET
complete with
dial indicator.



NEW ACCESSORIES

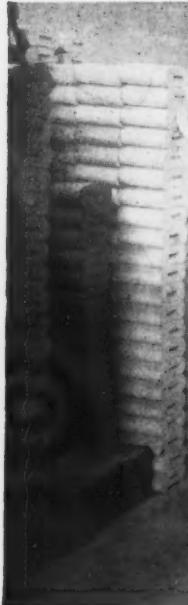
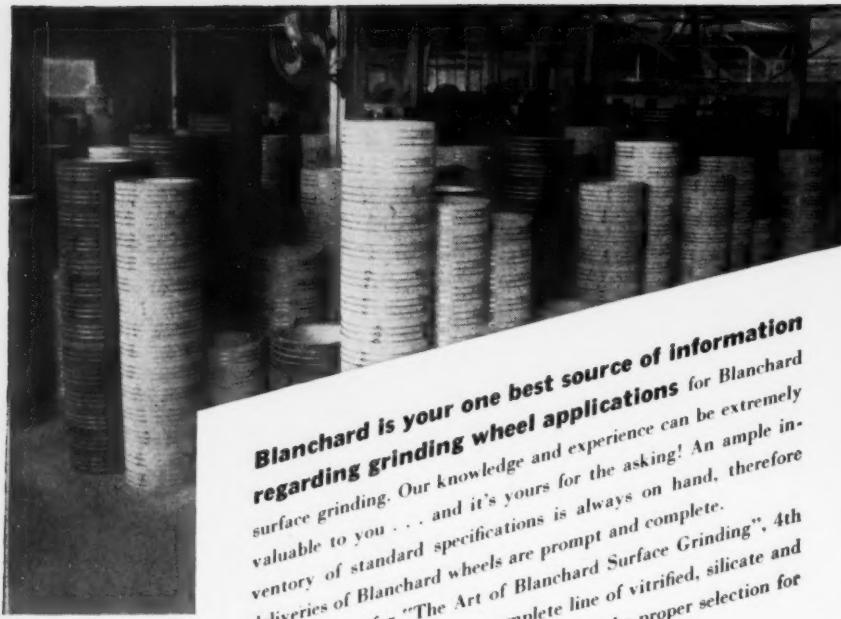
- RIGHT ANGLE ATTACHMENT
Permits gaging without removing work-piece from under bore spindle.
- EXTENSION RODS—may be used to length of 30" without loss of accuracy
- DEPTH ADJUSTER—used in conjunction with extension rods, permits gaging to any defined depth.

*Write today, or call NEWcastle 1-8888
for full information!*



FOSTER SUPPLIES CO.

6122 Milwaukee Ave., Dept. MMS, Chicago 46, Illinois
For more data circle 394 on Postpaid Card



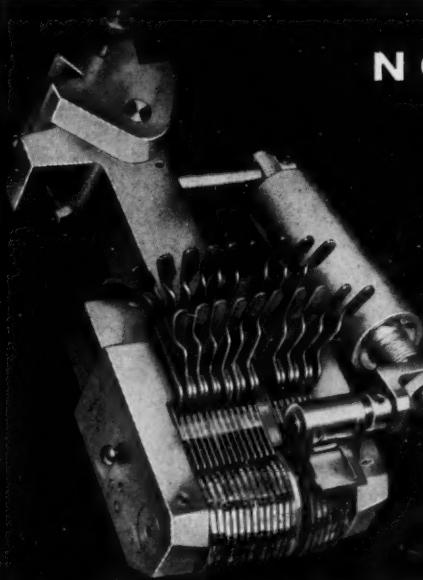
THE BLANCHARD MACHINE COMPANY

64 State Street Cambridge 39, Mass., U.S.A.

Blanchard is your one best source of information regarding grinding wheel applications for Blanchard surface grinding. Our knowledge and experience can be extremely valuable to you . . . and it's yours for the asking! An ample inventory of standard specifications is always on hand, therefore deliveries of Blanchard wheels are prompt and complete.

Send today for "The Art of Blanchard Surface Grinding", 4th edition, which describes the complete line of vitrified, silicate and resinoid bonded wheels and segments and the proper selection for Blanchard vertical spindle surface grinders.

For more data circle 395 on Postpaid Card



NOBLEWEST

Automatic

NUMBERING HEADS

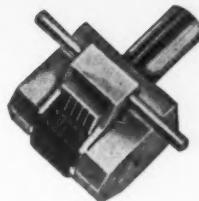
Model 484—New 20 digit lever-indexing automatic numbering head with unique air cylinder operation.

STANDARD OF THE MARKING INDUSTRY

Noblewest Numbering Heads are unsurpassed in precision, speed of operation and long life for every kind of permanently indented numbering. Made for use in either marking presses or Noblewest Roll Marking Machines, they are available in a wide range of automatic, non-automatic and lever operated models, a few of which are illustrated here. Applications are unlimited for constant, selective or consecutive (serial) numbering. Special numbering heads are designed and made for any requirement, including embossing heads.

Send for Numbering Head Catalog containing complete technical information. Noble & Westbrook Manufacturing Co., 25 Westbrook Street, East Hartford 8, Connecticut.

A few desirable territories open to qualified representatives.



Model 10 — Standard Automatic Numbering Head. Carried in stock in 6 and 7 wheels. Number sizes: 1/16 - 3/32 - 1/8 - 5/32 - 3/16.

MARK IT BEST WITH

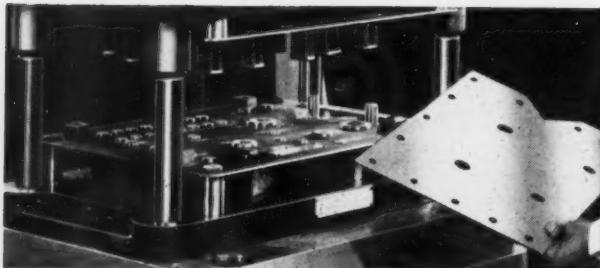
NOBLEWEST

NOBLEWEST
IMPROVED
MARKING
DEVICES

MARKING
NUMBERING
EMBOSSING
GRADUATING

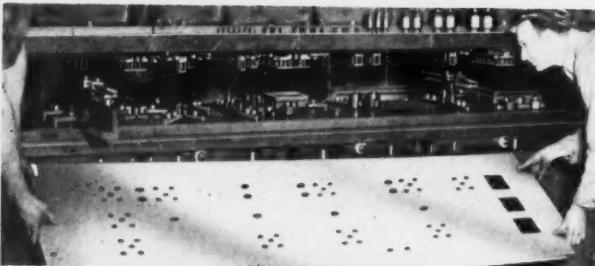
For more data circle 396 on Postpaid Card

OVER 2700 PLANTS are saving money with WHISTLER DIES



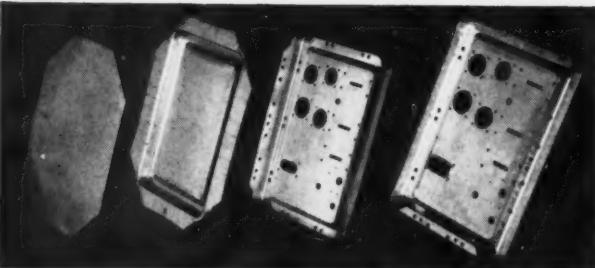
MAGNETIC PERFORATING DIES

All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia.
Larger sizes available.



ADJUSTABLE PERFORATING DIES

All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia.
Larger sizes available.



manufacturer
of all types of
CUSTOM DIES
for over 40 years

**WRITE FOR
COMPLETE DETAILS**

S. B. WHISTLER & SONS, INC., 740 Military Rd., Buffalo 23, N.Y.

Mail the following: Magna-Die Catalog Adjustable Die Catalog
 More information on custom die work

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____

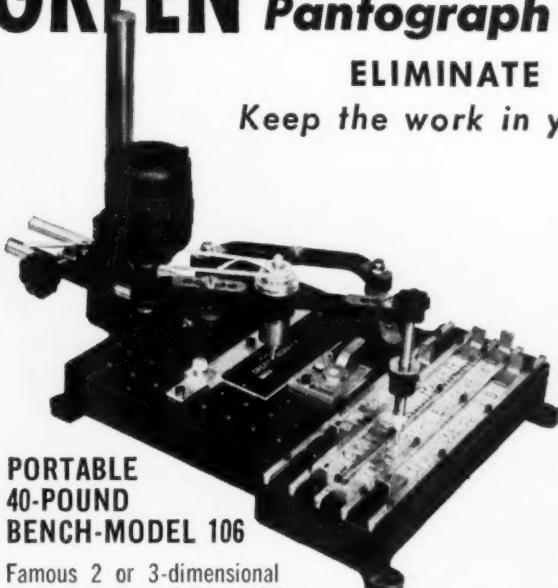


For more data circle 397 on Postpaid Card

GREEN Pantograph Engravers

ELIMINATE DELAYS!

Keep the work in your own plant.



PORTABLE 40-POUND BENCH-MODEL 106

Famous 2 or 3-dimensional engraver, successfully used by thousands, features 5 positive, accurate pantograph ratios. Versatile ball bearing spindle has three speeds up to 14,000 rpm; height of pantograph and position of cutter are continuously adjustable; one copy carrier (supplied) accepts all standard master type sizes.

The Model 106 has proven incomparable for speed and accuracy . . . yet reasonably priced.

Cutter grinders, rotary tables, master letters, compound slides, name plates and all required accessories. For complete information, write to



MODEL D2 HEAVY-DUTY 2-DIMENSIONAL

- 575 pounds — rigid, sturdy, precise
- Vertical adjustment of copy table automatic with Pantograph
- Unobstructed on three sides to take large work
- Micrometer adjustment for depth of cut
- Ball-bearing construction throughout — super-precision ball bearing spindle
- Spindle speeds up to 26,000 rpm for engraving or machining modern materials
- Ratios 2 to 1 to infinity — master copy area 26" x 10"
- Vertical range over 10"



**GREEN
INSTRUMENT
COMPANY, INC.**

392 PUTNAM AVENUE, CAMBRIDGE 39, MASS.

For more data circle 398 on Postpaid Card

YOU CAN MAKE ALL THE

on any *Di-Acro Bender*

Bar or tube, flat, angle or channel—you can bend anything bendable easily, accurately and quickly to the shape you want. And duplicate to die-accuracy too!

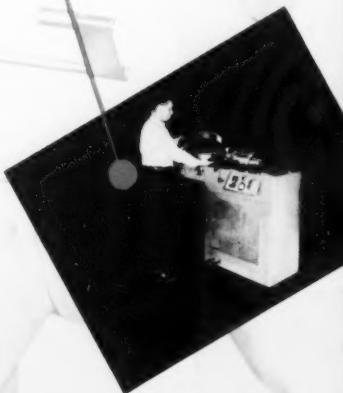
You'll find bending is superior to many forming and joining methods in the strength, function and appearance of the finished part—and best of all it's usually the lowest cost method.

A variety of standard radius accessories for forming bar, tube and flat stocks are available from factory stock. Specialized radius accessories such as those required for forming angle, channel and extruded shapes can often be made up in your own shop or a nearby job shop.

Often turning out just one "impossible" job can make your Di-Acro Bender worth its weight in gold . . . and you'll be able to handle hundreds of different bending jobs on your Di-Acro Bender! Available in hand or hydraulically powered models.



Use the postage paid coupon on the adjoining page . . . send for your free copy of "It's Easy to Bend" with more than 30 pages of how-to-do-it helps and information on Di-Acro Benders.



E BENDS AT LOW COST

IT'S EASY
TO BEND...



EYES



CIRCLES



ZERO RADIUS



SCROLLS



SQUARES



SPRINGS OR COILS



LOOPS AND SPIRALS



TUBE MATERIALS



EDGEWISE



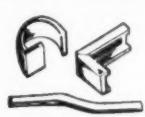
CHANNEL MATERIALS



ANGLE MATERIALS



SPECIAL SHAPED
MATERIALS



SPECIAL SET-UPS



WIDE MATERIALS



pronounced die-ack-ro

Please send me complete specifications on Di-Acro Benders and my free copy of "It's Easy To Bend".

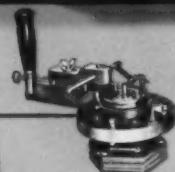
NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

DI-ACRO BENDER NO. 1



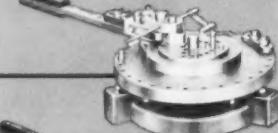
Material capacity of 3/16" round steel bar and 5/16" diameter steel tubing. Radius capacity 2". Weight 22 lbs. To 750 bends/hr.

DI-ACRO BENDER NO. 1A



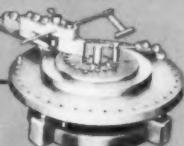
Material capacity of 5/16" round steel bar and 1/2" diameter steel tubing. Radius capacity 6". Weight 55 lbs. To 750 bends/hr.

DI-ACRO BENDER NO. 2



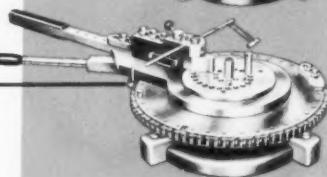
Material capacity of 1/2" round steel bar and 3/4" diameter steel tubing. Radius capacity 9". Weight 130 lbs. To 250 bends/hr.

DI-ACRO BENDER NO. 3



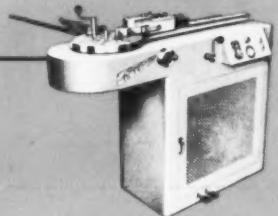
Material capacity of 1/2" round steel bar and 1" diameter steel tubing. Radius capacity 12". Weight 215 lbs. For large radius bends in heavy materials.

DI-ACRO BENDER NO. 4



Material capacity of 1" round steel bar and 1 1/4" diameter steel tubing. Radius capacity 12". Weight 250 lbs. For bending heavy materials where high production is not a factor.

DI-ACRO HYDRA-POWER
BENDERS



Materials capacities to 3/4" round steel bar and 1 1/2" diameter steel tubing. Radius capacities to 24" and more. Bends as fast as operator can load the machine.

BUSINESS REPLY CARD

No postage stamp necessary if mailed in the United States



O'NEIL-IRWIN MFG. CO.

306 EIGHTH AVENUE
LAKE CITY, MINNESOTA

FIRST CLASS
Permit No. 13,
Sec. 34.9, P. L. & R.
Lake City, Minn.

Men of Modern Machine Shop



ROGERS P. PARRATT, The Robert W. Walker Company . . . serving Northern California, Washington and Oregon.

★ ★ ★ ★



GEORGE E. HAY, District Manager . . . serving the Western Pennsylvania, Western New York, Ohio, Kentucky and Southern Indiana territory.

modern machine shop

ADVERTISING REPRESENTATIVES

Duncan W. Barton, 342 Madison Ave., New York 17, N. Y., Murray Hill 7-7390. Eastern Pennsylvania, Central New York State, New Jersey, Maryland, Delaware, Washington, D. C., Long Island, Brooklyn.

Granville M. Fillmore, Vice President, 342 Madison Ave., New York 17, N. Y., Murray Hill 7-7390. Eastern New York State, Connecticut, Massachusetts, Rhode Island, Vermont, New Hampshire, Maine.

John M. Krings, Vice President, Room 211-A, 540 N. Michigan Ave., Chicago 11, Illinois, DElaware 7-5441. Western Michigan, Illinois, Wisconsin, Iowa, Minnesota, the Dakotas, Northern Indiana.

George E. Hay, 431 Main St., Cincinnati 2, Ohio, CHerry 1-5924. Western Pennsylvania, Western New York, Ohio, Kentucky, Southern Indiana.

Jeryl L. Marlatt, 1051 Brooklawn Rd., Birmingham, Mich., MIDwest 6-5935. Eastern Michigan, Northwestern Ohio.

Norman S. Rogers, 431 Main Street, Cincinnati 2, Ohio, CHerry 1-5924. Central Indiana.

Gene J. Schwarber, Advertising Manager, 431 Main Street, Cincinnati 2, Ohio, CHerry 1-5924. Missouri, Kansas.

The Robert W. Walker Company, 730 South Western Ave., Los Angeles 5, Calif., DUnkirk 7-4388, 57 Post St., San Francisco 4, Calif., SUtter 1-5568. California, Oregon, Washington.

★ ★ ★

modern machine shop
431 Main St. Cincinnati 2, Ohio



Fred W. Vogel

Over the Editor's Desk

SUMMER SURGE

The economic picture being painted during recent weeks by the serious students of our business climate seems to show more clearly a continuation of a high level of activity in practically every field, construction, automotive, retail sales, to name several, and in the field of most concern to us—metalworking. It is the feeling of many business executives that while industry, against the threat of a steel strike, has tried to stock up on many items for summer and autumn use, heavy current production has prevented a degree of inventory building which would substantially reduce future ordering. New orders are reported continuing to be booked in large volume. Employment is reported gaining. Generally, prices paid for the raw materials of industry are said to be firming even under the pressure of heavy buying.

Ever since the end of World War II, industry spending for new plant and equipment has been a significant prop for the United States economy. During the 1957-58 recession, many expansion plans were trimmed or pigeonholed. Indications are that corporations are again planning large outlays. The Federal Reserve Bank of Philadelphia, in a survey late last year, found that manufacturing concerns in its area planned to spend 11 percent less this year for new and improved plant equipment than in 1958. In a new survey, just completed, the bank found that the same industrial group now expects its 1959 plant and equipment spending to be 11 percent greater than in 1958. This sampling of intentions, applied on a National scale, would point to a new record capital outlay approaching \$40 billion.

Some observers have noted that during the past decade or so, most of the capital spending has been "defensive" in nature, aimed at replacing obsolete or inefficient equipment or to cut down on overtime in an era of rising labor costs. The expansion now apparently under way is required in many industries to meet increased demand.



Put
the bite
on metal
separating costs

Hold the metal separating line with Nicholson or Black Diamond Hacksaw and Band Saw Blades. We make blades to speed your work and hold the cost on almost every industrial metal separating job. You'll see what this means when you try them. Your Nicholson or Black Diamond Blade Distributor will be glad to work closely with you to choose the right blades. A talk with him may well lead to lower costs and improved results. Ask him, too, for money-saving data on our Precision Ground Flat Stock.

* *Industrial Distributors provide the finest goods and services in the least possible time. We sell exclusively through them.*

Files • Rotary Burs • Hacksaw and Band Saw
Blades • Ground Flat Stock • Industrial Hammers



NICHOLSON



Nicholson File Company, Providence 1, Rhode Island

NICHOLSON

TN1408-4

14" x 1 1/4" x .062-63
All Hard Tungsten 18-4-1

For more data circle 400 on Postpaid Card

Over the Editor's Desk . . .

LETTER PATTERN

Individuals who make their livelihood by writing will readily admit that writing is a chore. And this opinion is offered both by the professional as well as the amateur. It is no little wonder then that the average lay person avoids the chore of writing, particularly when it comes to the matter of expressing himself through the medium of letter writing, even on issues involving himself and his family.

Dr. George S. Benson, President of National Education Program feels that more people would write to their Congressmen, for example, if they knew how to do it. Consequently, in one of his recent messages to us he enclosed a copy of a letter about which he says: "A friend of mine recently wrote a very sensible letter to his Congressman and sent me a copy. It is a fine pattern, and here it is."

Honorable John Doe
House of Representatives
Washington, D. C.

My dear Congressman:

There are a number of issues in Congress affecting the welfare and security of my family and my neighbors. I feel that it is my citizen's duty to inform my representative in Congress of my opinions on these issues.

First, I am worried about the growth of Communist power throughout the world. Through the administrations of both Democrats and Republicans our foreign policy has permitted victory after victory for international Communism. Certainly the Red conspiracy is being aided tremendously by the stealthy work being done and the atmosphere of opinion created by Communists and their dupes within the United States. I respectfully request that you give your support in every way to the work of the House Un-American Activities Committee and to the Senate Subcommittee on Internal Security. I ask further that you aid them in preparing legislation to protect our nation against subversive activities to re-establish the security safeguards which the Supreme Court has destroyed with recent decisions.

I ask that you back Senator McClellan all the way in his fight to: (1) establish democratic control in labor unions; (2) erect legal protections for the rank and file workers; and (3) destroy the unwholesome power of those labor bosses who obviously threaten the very existence of our American way of life. I ask that you support legislation to gradually take the government out of the business of farming. I respectfully request that you exercise your influence against any further increase of federal debt or federal spending.

Our national debt is more than \$280 billion and rising; our annual federal budget has reached \$80 billion; taxes are grievously high and are smothering the incentive that has made America prosperous and strong. Please use your influence to halt the growth of government, to cut governmental spending, to reduce the great waste, to balance the budget; and finally, to reduce everybody's tax burden.

Respectfully yours,

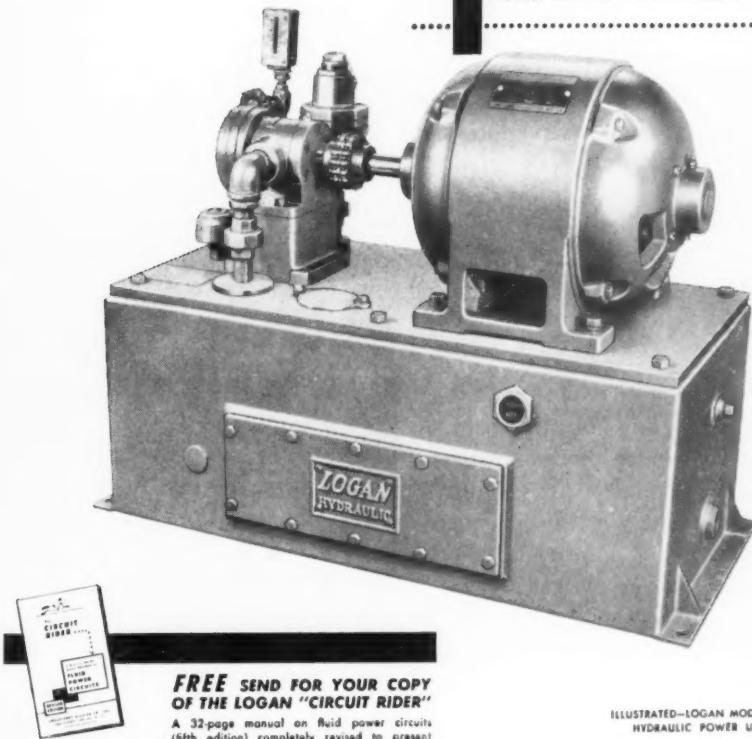
If the problems on your mind are the same as the friend of Dr. Benson, or even if they differ, we are sure that your Congressman will appreciate hearing about them directly from you. Why not write that letter today?

LOOK!

LOGAN HAS IT!

RIGHT PRICE
TOP QUALITY
PEAK PERFORMANCE

In hydraulic power devices



FREE SEND FOR YOUR COPY OF THE LOGAN "CIRCUIT RIDER"

A 32-page manual on fluid power circuits (5th edition) completely revised to present current engineering trends.

MEMBERS: Nat'l. Mach. Tool Builders' Assn.;
Nat'l. Fluid Power Assn.

For more data circle 401 on Postpaid Card

July, 1959

modern machine shop 97

LOGANSPORT MACHINE CO., INC.
801 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:

- 100-1 AIR CYLINDERS
- 200-1 HYD. POWER UNITS
- 100-2 MILL-TYPE AIR CYLS.
- 200-2 ROTOCAST HYD. CYLS.
- 100-3 SUPER-MATIC CYLS.
- 200-3 750 SERIES HYD. CYLS.
- 100-4 AIR VALVES
- 200-4 AND 200-7 HYD. VALVES
- 100-5 LOGANSQUARE CYLINDERS
- 200-6 SUPER-MATIC CYLS.
- 100-6 ULTRAMATION CYLINDERS
- 300-1 CHUCKS
- 300-2 PRESSES
- ABC BOOKLET
- FACTS OF LIFE
- CIRCUIT RIDER

TO:

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

ILLUSTRATED—LOGAN MODEL 401
HYDRAULIC POWER UNIT

Over the Editor's Desk . . .

SUMMER READING

Have you ever considered *Modern Machine Shop* as good reading material while you are on vacation? Of course, it's wonderful to have a real honest-to-goodness vacation, to get away from the worries and responsibilities of the shop for a week or two, to be able to completely forget that there is such a thing as having to work for a living, to enjoy driving on a wide open highway, to know the joy of a tug at the end of a fishing line or the restoring balm of mountain quietude or the invigorating elixir of a sandy sun drenched beach.

But a vacation, whether spent at home or miles away, also can be a good time for catching up on a lot of things that you have let slide like checking more thoroughly the information on new developments described in advertisements and editorial articles. It's a good time, too, for reading those editorial feature articles that you tore out of the magazine and filed away in a folder for just such an opportunity as this.

Modern Machine Shop is addressed to you at your place of business, that's where you receive it and that's where we hope you'll make most use of it. But this year we would like to suggest that you tuck your copy in your pocket as you leave the shop on the weekend before vacation, pack it in your bag if you take a trip, and take some time at your leisure to go through the issue. You'll be surprised how much you'll get out of it.

* * * modern machine shop * * *

BETTER MATERIAL

Inside the Latrobe Steel Company's new facility which houses a new Consumable Vacuum Arc Melting Furnace, President M. W. Saxman of Latrobe Steel Company discusses with Editor Fred W. Vogel of *Modern Machine Shop* several improved metallurgical characteristics, clearly visible in vacuum arc melted steel and alloy samples, particularly when compared with alloys obtained by other methods (see item page 160).



Fine tools
that encourage
Good Work



ARMSTRONG WRENCHES

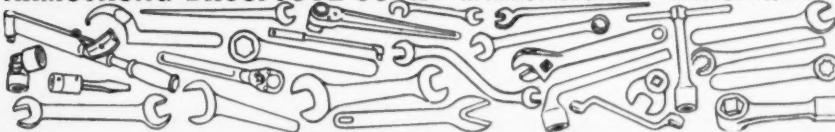


If you don't know your local ARMSTRONG Distributor we will send you the names of those in your area.

An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN

(carbon steel) Wrenches in baked-on gray enamel with heads ground bright . . . all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant . . . 1537 different industrial sizes and types —single wrenches, or sets in metal cases, boxes or rolls . . . each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

ARMSTRONG BROS. TOOL CO. 5228 W. ARMSTRONG AVE. • CHICAGO 46, U.S.A.



For more data circle 402 on Postpaid Card

The FORWARD for Space Age

Machine Shop and Engineering working together solve problems in producing ballistically-operated store ejectors at "forward looking" Bohanan plant.

By GILBERT C. CLOSE
Field Editor, Modern Machine Shop

At the turn of the century, a contracting manufacturer's past accomplishments could be used as a criterion of his ability to accomplish new work. Now, with the space age

literally thrust upon us, this old yardstick of ability is being outdated. Today, in the production of many products, the ability to accomplish practical research and



The estimating and planning departments and chief inspector's office shown here are located near the center of the shop area where maximum work liaison may be maintained.

LOOK

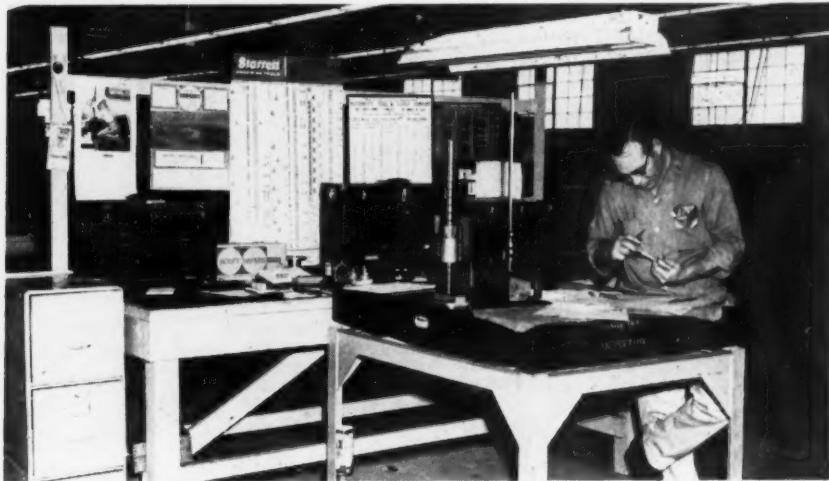
Shop OBSOLESCENCE

make constructive use of the results is more important than past experience. New materials, new designs, and new and unprecedented product requirements have very little to do with that which has been done in the past.

This bit of philosophizing applies to the shops as well as to the manufacturing organization as a whole. To prove the point, note the many new shops which have started business during the past ten years, and

which are successfully producing products which were never produced before. In many instances, these shops are employing entirely new materials, new processes, and they have had to develop new techniques accordingly.

The Bohanan Manufacturing Company, Compton, California, a Division of The Gabriel Company, is typical of these new "forward looking" manufacturing and shop organizations. Bohanan started



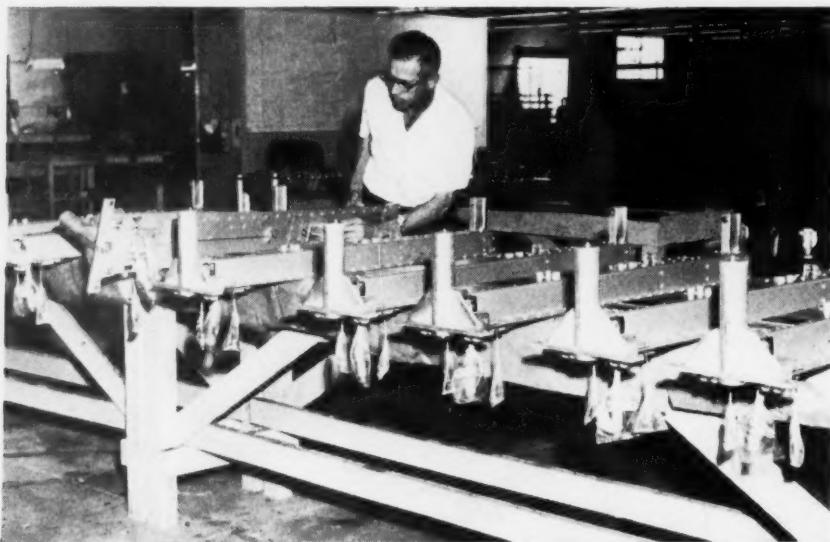
In the Bohanan Manufacturing Company plant, the first article inspection station, as shown in this view is located right in the major machine area for optimum convenience.

"Each operation must be engineered from 'scratch' . . ."

business about eight years ago. In this short space of time, they have become one of the nation's major producers of ballistically operated equipment, and have acquired an enviable reputation in high precision sub-assembly work. The 56,000 square feet of well-tooled shop space and 150 employees will soon be joined by another 56,000 square feet of manufacturing and assembly facilities. Many of the materials and processes they employ are as new as the company itself. New shop techniques have been developed accordingly. Each new product, job, and assembly operation must be researched and engineered from "scratch," so to speak, to incorporate these new materials,

processes and techniques. This research extends from initial design to final production testing and picks up all shop operations in between.

Production of Bohanan's ballistically-actuated store ejector unit for airplanes is a good example of how "the forward look" must be employed in modern, progressive shop organizations, rather than reliance on past experience. This ejector, mounted externally and usually on the underside of the airplane's wings, is used to carry external loads such as bombs, auxiliary fuel tanks, or other stores or supplies which can be dropped from the air. At the time of dropping the load, a ballistic charge opens the twin hooks to which the load is attached,

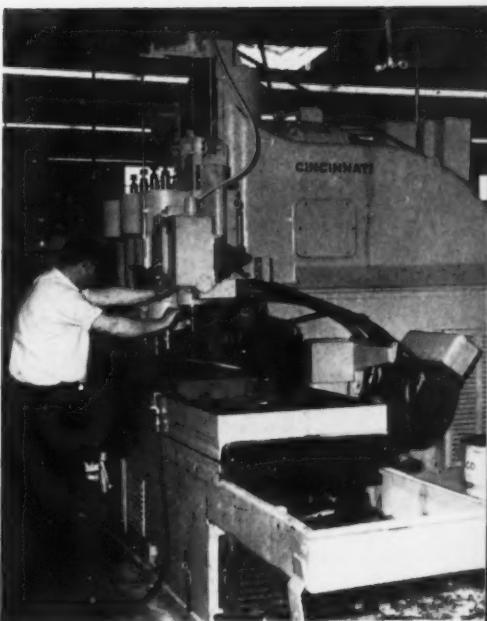


In this view, finished ballistically actuated store ejector units are shown being given a final shop inspection before being passed on to a subsequent military inspection.

then ejects the load away from the airplane at much greater speed than would be accomplished by a free fall. The force of the ejecting piston on both the fore and aft hooks may be adjusted so that the dropped load may be made to fall level, or pitch forward or in reverse as requirements may dictate. The explosive force for actuating the pistons is obtained through tubes from a single breech in which the ballistic charge is fired by means of electrical controls in the cockpit.

Both design and production problems on this unit were complicated by the fact that operational pressures may soar to 40,000 p.s.i. maximum for from 50 to 60 milliseconds, while operational temperatures run as high as 8,000 degrees F. for the same interim. As this pressure must be transmitted from the single breech through a pair of tubes into the fore and aft piston cylinders, some complicated sealing problems evolved.

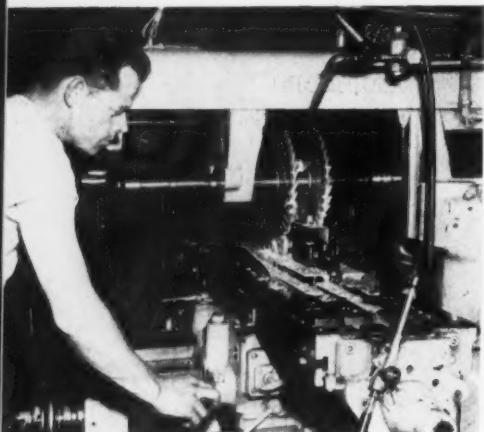
As pointed out by Don Herbert, Bohanan's chief engineer, conventionally-used Class 3 threads on plugs and fittings screwed into the unit were not tight enough to retain such pressures. In some cases, Class 4 threads had to be specified. This required a change-over to special thread gages and taps and dies throughout the shop. A second method used to secure sufficient sealing was to drill into the threads and insert a nylon plug. The protrusion of this plug would crush down and effectively "dam" a couple of threads during insertion. In addition, the friction of the nylon insert also acted as a fitting retainer after it was properly installed.



This large servo-automatic machine is used for much critical tooling work at Bohanan. View shows a check plate being machined.

A second sealing problem had to do with attachment of the pressure transmitting tubes to the breech and to the two cylinders in which they terminated. To accomplish a good seal at these points, slip-fit tube holes were drilled and reamed in both the breech and the cylinder heads. These holes were given a slight inward taper so that the very ends of the tubing could expand slightly under maximum pressure conditions. This expansion does not exceed the elastic limit of the 4130 steel tubing used, and the tube ends return to normal size after firing. At the same time the tube end expansion is sufficient to hold the tubing in the slip-fit hole

"...constructive research is the only answer."



Though prototype parts are machined from solid billet or bar stock, conversion to forgings is made after design has been established. Here a breech in which the explosive charge takes place is being milled from a critically inspected 4130 steel alloy forging.

and thereby provide an extremely tight seal during maximum pressure conditions.

"The funny part of it is, such connections would leak badly if used in a low pressure system," Herbert explains. "The pressure must be high enough to actually expand the metal within its elastic limit, and thus provide an effective seal."

A second problem which required the "forward look" in its solution was concerned with drilling of the orifice holes through the entrance plugs installed in each cylinder. These plugs are interchangeable, and the size of the orifice drilled through them controls the amount of pressure admitted to each cylinder from the explosive charge, thus

making it possible to adjust the ejection force at each load hook.

To begin with, the orifice hole in the 4130 steel alloy plug was first drilled, then the plug was heat treated in an atmospherically controlled furnace. When produced in this conventional manner, a single firing would so enlarge the orifice hole that the plug had to be replaced. Attempts were made to produce these orifice plugs from many different alloys, but to no avail. The tremendous pressures involved would so enlarge the orifice hole in a single firing that the plug had to be replaced. During the course of this research, a 4130 plug was machined, heat treated, then the orifice hole was drilled after heat treating. When tried out, this plug with the orifice hole drilled after heat treatment withstood 25 consecutive firings before the hole became enlarged. Today all orifice plugs are produced in this manner.

Herbert explains it this way . . . "The problems involved in producing ballistically operated equipment are very similar to the problems involved in explosive metal forming. The pressures are so great and things happen so rapidly that metals do not have time to react in a normal manner. So constructive research and experimentation is the only way to get an answer."

The surface finishes used on the various ejector components posed a number of problems because of the high pressures involved, the heat, and the highly corrosive residue resulting from each explosive charge. Conventional cadmium

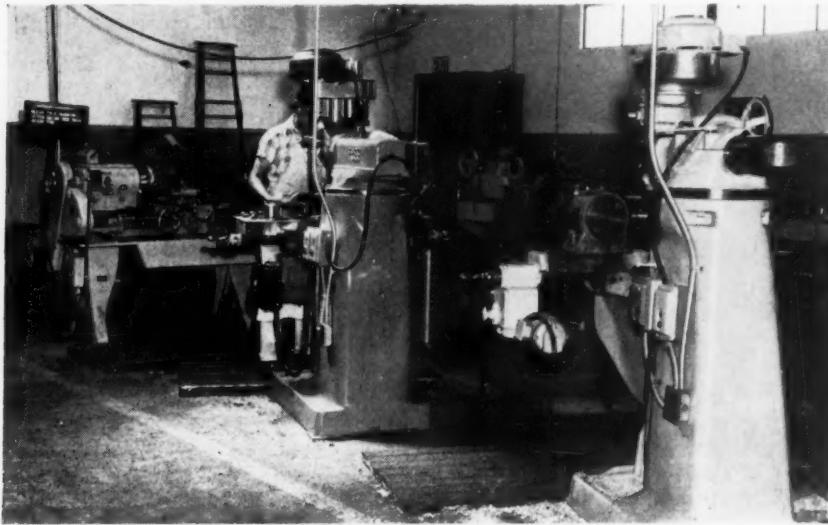
plating is torn loose in the face of the dynamic pressures created by an explosive charge. These same pressures will drive corrosive residue through the porous structure of conventional hard chrome plating and cause rapid corrosion of the underlying metal.

Nevertheless, it was considered that the piston and the cylinder walls in the two ejection cylinders on each unit must be hard chrome plated for wear and heat resistance, and for the low coefficient of friction involved. Various methods of applying an acceptable hard chrome plating were researched. Finally what is called a chrome-grind process was evolved. This process includes an initial grind of the surface to be plated, then application of an exceptionally thick hard chrome plate ranging from 0.004 to

0.005 inch in thickness, followed by a second grinding of the plated surface. The second grinding actually "smears" the chrome plating and effectively seals its porosity. Final hardness of the plating approximates Rockwell C-72.

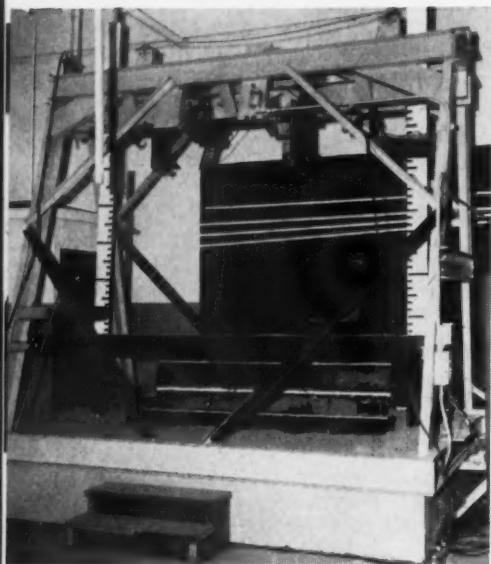
"Despite the rugged nature of the results, this is a very delicate plating job," Herbert points out. "Very few commercial plating shops are equipped to accomplish it. Final tolerance of the piston-cylinder assemblies must be held within 0.0003 to 0.0006 inch in bore clearance after the final grinding. This demands precise control over every phase of the plating operation."

All parts of the ejector unit which are not in contact with the high-pressure gases are cadmium plated. Parts in direct contact with the gases are given a phosphate



This illustration provides a view of one corner of the prototype shop at Bohanan where new products are built and perfected before being placed on a shop production line.

"... setting up the final production line is easy . . ."



Company-designed test apparatus for test firing of ballistically operated store ejectors. Store is suspended from ejector hooks shown at top into sand box below. Lines on back-screen appear in high speed photos made to show position of load just after firing.

coating. All internal threads are cadmium plated. This requires a double surface finishing job on many components, with the surfaces to be finished differently masked off during each finishing process.

The above are typical of the many "problems without precedent" involved in the production of space-age equipment. Because of this, research and ingenuity are the only keys to a solution. Needless to say, the many unknowns involved affect shop operations as well.

The shops at Bohanan Manufacturing Company are well suited to

research, production, and critical assembly operations. Mills and turret lathes, because of their versatility and ability to turn out precision work, constitute the bulk of major machines. A large, automated servo-hydraulic is used for some jobs. The drill press department includes precision turret drills, and tooling for the punch press departments runs the gamut of compound and progressive dies. Production testing equipment is comprehensive and complete, including even a room set aside specifically for test firing and for qualifying the various ballistically operated products.

Tony Andreucci, plant manager and "old-timer at large" in all phases of shop operation, pointed out various shop operations and arrangements which expedite the research and engineering work required.

To begin with, a separate prototype department is employed in product development. This department is tooled to machine all component parts from billet or bar stock and to completely develop the first unit in a new product line. During this prototype developmental work, all major engineering and design changes are instigated, and the best machines and setups for producing each part are worked out. Thus, when a prototype product has been built, tested and approved, all major shop production problems have been solved as well, and setting up the final production line is a relatively easy task.

The estimating and the planning

departments, the quality control manager's office, and the inspection department are located directly in the center of the shop area, thus making it simple to maintain very close liaison with the work going on.

In high precision shop work, interchangeability of parts has always been a problem. At Bohanan, a single location point is used for all setups, and all dial gage readings must be exactly the same before a job is started. This practice, in conjunction with the use of a machine which can consistently maintain and reproduce setup tolerances, greatly simplifies the interchangeability problem.

Many of the machine operators at Bohanan are specialists in their respective field. These include experimental machinists, milling

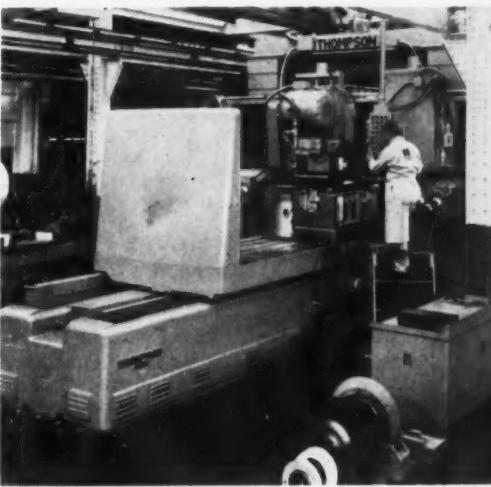
machine machinists, and men who have specialized in the use of a turret lathe. As Andreucci points out, such specialized knowledge is extremely useful when it comes to visualizing new setups to perform new types of work. Specifically, the operators must be able to employ their machine knowledge constructively, not objectively by being able to duplicate what they have done in the past.

So in the machine shop, too, as well as in research, design, and engineering, the "forward look" is necessary. Without it, or failing to recognize its importance, many shops which have been in operation for years will soon find themselves surpassed in accomplishments by much younger manufacturing organizations with a wide open mind.

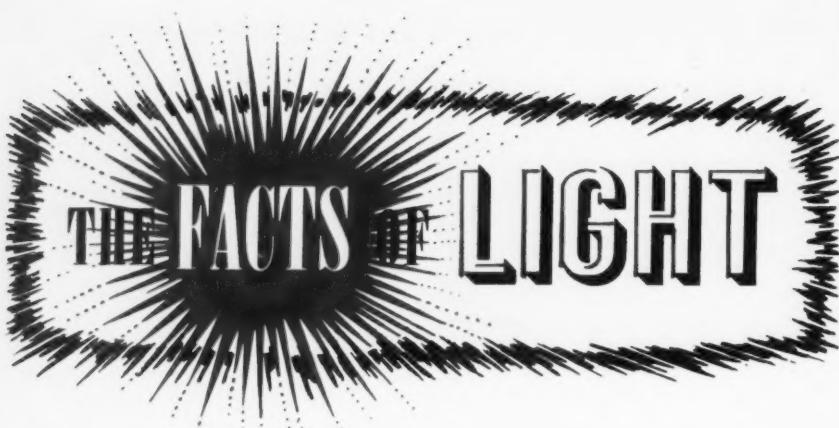


75-Ton Surface Grinder

A huge Thompson Hydrail surface grinder weighing 75 tons and occupying 420 square feet of space is now in operation at The Heald Machine Co., Worcester, Mass., where it has mechanized the grinding of machine ways, substantially reducing hand scraping operations on many machine tools. The giant machine, measuring 30 feet long by 14 feet wide by 13 feet high, provides three grinding wheel spindles for grinding vertically, horizontally or angularly. The work table is 5 by 12 feet and moves at a maximum speed of 100 feet per minute. The machine incorporates a unique filtering and refrigeration system that permits reuse of the 500-gallon capacity water-oil coolant.



Massive surface grinder used in the Heald plant to mechanize the grinding of machine ways, thus reducing hand scraping operations.



THE FACTS OF LIGHT

The author, discusses, in simple easy-to-understand terms, the subject of lighting as it applies to the modern metalworking plant.

By RALPH O. SMITH
Industrial Engineer

It's all in a day's work to the men representing the lighting industry, but to many attempting to modernize their shop area, the language of lighting is not always easily understood. Have you ever been exposed to terms like foot-candles, reflection factors, glare ratios, brightness ratios, and so on? Well, relax, let's take a look at lighting from a layman's point of view.

Light is the essential condition of vision—the human eye is blind without it. Obvious, sure, but how much light do we need and what are the conditions of good seeing. Man first used light from his fire in a cave. We progressed from this to candles, oil lamps, gas lamps, to electric incandescent lamps. The

future promises a new source called "electroluminescence," but for now fluorescent lamps provide the most efficient source of light, yielding nearly three times the light energy for the same wattage we would use with incandescent lamps.

Now, lighting, more than ever before, is becoming a conversation piece to industry. Perhaps it obeys the old adage that "good news travels fast." Manufacturers who perhaps up to now have not even given light requirements a passing thought, suddenly have become aware of the revolution that is taking place in the concept of lighting—that there is an obvious connection between a man's seeing ability and his working ability. How direct-

ly related these are depends, of course, on what the job is. A bulk storage operation does not require the light of an office, but certainly a machine operator has tasks that are as critical as many office tasks. In fact, if you will think about it, the seeing job in a machine shop can be a lot tougher because of soiled drawings, fine scribe marks, micrometer readings, poor contrasts around machine and work, and other factors.

The reason lighting has become so important can be found in the savings that can be realized. The savings of any lighting installation are not always obvious. The benefits in a good pair of shoes over a cheap pair (or going barefoot) may not ever be apparent to some. If you are

vaguely interested in this subject of good lighting, you have perhaps scanned articles containing claims that many companies have reduced minor accidents 50 percent or more, reduced rejects as much as 20 percent, and increased worker efficiency by 10 percent. With these figures in mind, it is only fair to let you put your own price tag on such savings as related to your operation.

Why should we spend the money? Why aren't the fixtures we have at each machine enough? We have light, the men don't complain! Have you ever said this to a lighting engineer or to yourself on reading an article such as this? Lighting engineers hear these very questions nearly every day. To answer them all politely, we must resort to the



Materials handling area for packing and labeling receives about 50 footcandles under new standards. Comfortable seeing is provided by well-shielded fixtures with uplighting.

"... light meter is used to measure 'footcandles'."



High bay area where ordinary inspection is done receives recommended lighting from high-output rapid-start fixtures. 25 percent upward light eliminates contrast of dark ceiling.

yardstick of the trade for a little help. This tool is called a light meter and with it we measure "footcandles." Don't let the term worry you—let's just keep some numbers in mind that represent the amount of light measured under various conditions. Take a mental walk with me for a moment out into the sunlight. If we opened our light meter outside, we would read about 10,000 footcandles. We adapt our eyes to the light—maybe squint a little if the sun's angle is just right—but we notice we can see every detail. We see lint on our coat we hadn't seen indoors; we see every blade of grass (and the grain of dirt where

maybe there ought to be grass). We might even be able to find that proverbial needle in the haystack under this light.

Now, let's move to the shade—the meter drops all the way down to about 500 footcandles. You wouldn't have to remind a photographer of this. Even the man with the box camera knows the difference between his pictures taken in the shade or taken in the sun. Our eyes accommodate to the change in light and we now notice we can still see very well, but certainly with considerably more comfort if we were trying to read.

The sun now is clouded over and

we have an overcast sky. We step out to measure the light and we see that a cloudy day is 500 to 1,000 f.c., depending on the density of the clouds. The seeing is very good and certainly comfortable, but colored objects are very lifeless.

Now we step back indoors to what we thought was good lighting and we walk across the room with its fixture here, fixture there, and we watch the light meter swing from 2 or 3 footcandles to 30 footcandles. We notice that just as we squinted outdoors in the sunlight, we now squint as we pass from the areas of 2 footcandles to the area of 30 footcandles. This is the type of eye-strain that the worker is subjected

to every time he turns around or looks up from his work. Is there any wonder we are eye-weary at the end of the day? I think we will all admit that we would certainly like to carry our work outdoors for we know how well we would be able to see detail work, read our micrometer, scale, or blueprint. (By the way, how many times have you seen a machinist in the shop carry his micrometer to the window in order to read it?)

A study of the new recommended levels of light on the task at any time shows the amount of light necessary increases with the difficulty of the task. These new lighting levels are the result of eight



In this medium assembly area, a very high output lamp is employed in alzac aluminum fixture for low fixture brightness. Reaching

120 footcandles of maintained illumination, the walls, ceiling and floor must be kept light in color for maximum comfort and efficiency.

"Lighting should be even to minimize eye adjustment."

LAUNDRIES	
Washing	30
Flatwork ironing, weighing, listing and marking	50
Machine and press finishing, sorting	70
Fine hand ironing	100
LEATHER MANUFACTURING	
Cleaning, tanning and stretching, vats	30
Cutting, fleshing and stuffing	50
Finishing and scarfing	100
LEATHER WORKING	
Pressing, winding and glazing	200
Grading, matching, cutting, scarfing, sewing	300
LOCKER ROOMS	20
MACHINE SHOPS	
Rough bench and machine work	50
Medium bench and machine work, ordinary automatic machines, rough grinding, medium buffing and polishing	100
machines, medium grinding, fine buffing and polishing	50
Fine fine bench and machine work, grinding	
MATERIALS HANDLING	
Wrapping, packing, labeling	50
Picking stock, classifying	30
Loading, trucking	20
Inside truck bodies and freight cars	10
MEAT PACKING	
Slaughtering	30
Cleaning, cutting, cooking, grinding, canning, packing	100
PACKING AND BOXING (see Materials Handling)	
PAINT MANUFACTURING	
General	30
Comparing mix and standard (see Color Matching)	200
PAINT SHOPS	
Dipping, simple spraying, firing	50
Rubbing, ordinary hand painting and finishing art, stencil and special spraying	50
Fine hand painting and finishing	100
Extra fine hand painting and finishing (automobile bodies, piano cases, etc.)	300
PAPER BOX MANUFACTURING	
General manufacturing area	50

New tables of minimum levels of lighting for a given seeing task have been established by the Illuminating Engineering Society, based on the findings of the recent Blackwell Report. It may be seen here in this excerpt that the amount of light that is required increases as the task becomes more difficult. A complete table of minimum levels of lighting should be obtained in determining the proper levels of lights for the various operations being performed in a particular plant or shop area.

years of extensive scientific study and ten million observations by Dr. H. Richard Blackwell, Director of the Vision Research Laboratories at the University of Michigan. You will note the comparison with our comfortable outdoor lighting with the values shown in the accompanying table for difficult seeing tasks. We might say that the new studies verify what engineers, lighting experts and progressive plant managers know from experience with lighting installations over the last few years.

Just adding more lighting fixtures to achieve higher levels of lighting is *not* the answer to correct poor plant seeing conditions. Lighting is a science and certain rules must be adhered to. One of the most important components of good lighting is uniformity — the fixture-here, fixture-there method accomplishes nothing at all in the interests of uniformity.

Lighting, therefore, over the work areas of the shop, should be as even as possible to minimize eye adjustments. Where local lighting, i.e., lights on machines for extra high level of illumination, must be used, the difference between this lighting and the general lighting must be in proper portion.

In the discussion of good seeing conditions, we would be remiss if we did not stress the importance of color of the walls, ceiling, floor and machines. Walls absorb an amazing amount of light as everyone has discovered in trying to put a desk or machine next to a wall. If the wall is dark, it may absorb 70

percent of the light hitting it. If it is a light green, for example, it may only absorb 30 percent. The ceiling should be as light as possible with a flat white preferred. White will reflect about 80 percent. Whether by design or not, some light hits the ceiling; therefore, the more light that can be reflected back, the more usable light we will have to work with. In addition, a light ceiling also gives a far more spacious and comfortable feeling, thereby making the whole ceiling appear as though it were lighted.

Again, think of the comfort of a cloudy day. A dark ceiling presents what is commonly called a "tunnel effect," with a rather forbidding atmosphere. Actually, today's lighting fixtures are being designed to project a portion of light to the

ceiling. This particular subject will be discussed more fully later in the article.

Floors should be as light as possible. This is as difficult, to be sure, as it often is for the ceiling and walls. Nevertheless, it pays dividends in the efficiency of lighting as well as in the general attitude of the workers, greater safety, better housekeeping, and in the reflected attitude of customers. One machine shop operator, not realizing perhaps the techniques of good lighting, confessed one day that he found an amazing difference in the appearance of the room and the seemingly improved lighting by keeping some clean oil-absorbing material on the floor. Actually, he was reducing the amount of light absorbed by a dark, oily floor from 90 percent to, per-



Continuous rows of well designed, high output fluorescent fixtures provide high comfort and see-ability. The lack of light glow in

the illustration verifies the lack of fixture brightness and glare. Workers enjoy a very comfortable 120 footcandles of illumination.

"Machines should be light in color to reduce contrast . . ."

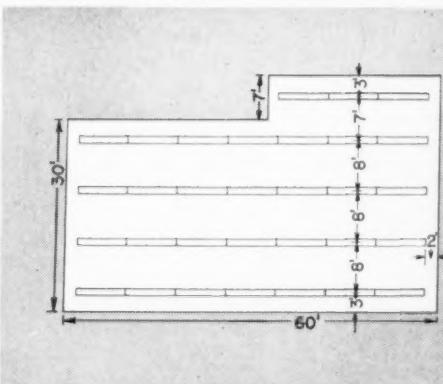
haps, 30 percent. Is there any wonder he could see a marked improvement?

Machines should be of light colors too. For safety, most paint companies advocate a color coding of moving and stationary parts. Many modern machine shops follow this avidly once it has been inaugurated. Machines should be light in color for all the same reasons as we have stated previously—to reduce the contrast of objects within our vision and to reflect rather than absorb light. Machine manufacturers have come to realize this and, whereas all machines were painted black, they are now painted a light grey or green. At one time, all typewriters that were produced were painted black. Could there be any greater contrast for the operator than to look from a white piece of paper to her black machine? Now, a great many typewriters are painted in very pleasing light pastel shades of your choice.

General illumination is intended to supply the lighting to the general area without regard to the placement of machines or desks. On this basis, equipment may be moved without a corresponding move in lighting. In the design of a lighting layout, a good rule of thumb to keep in mind that will prevent errors in placement of fixtures is that rows of fixtures must not be spaced any farther apart than the distance they are mounted from the floor. In numbers, if it is desired to mount the fixtures 9½ feet off the floor, the rows of lighting fixtures must not be more than 9½ feet apart—prefer-

ably less. One half of this spacing distance should be the space from the last row of fixtures to the shop wall.

Let us briefly discuss the type of fixtures or luminaires available and their use. Fluorescent luminaires (with which we are primarily concerned) do not just consist of a ballast, sockets, lamps and a contorted piece of metal for a reflector, contrary to popular conception. A luminaire manufactured by a reputable firm is a piece of equipment into which has gone a great deal of study. Its ability to distribute light, its shielding (placement of lamps within the reflector), the quality of the paint for lasting whiteness, quality of the ballast for minimum power loss and maximum length of



Area calling for 100 footcandles of general illumination might use this layout. Sketch calls for 96-inch industrial fluorescent luminaire with 25 percent uplighting. Lamp specified is high output standard cool white. Luminaire is mounted 9 ½ feet above floor with 10 ½-foot ceiling. Calculations assume white ceiling, light colored walls and floor.

life of itself and the lamps it controls, the gauge of the metal, the convenience of hanging, wiring, cleaning and relamping of fixtures are all important factors to be considered.

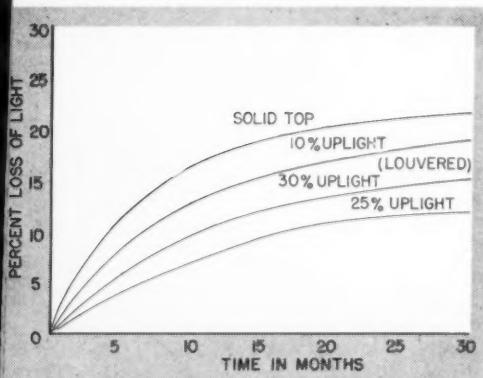
With higher levels of lighting, another feature must not be overlooked in a possible effort to economize. This is *uplighting*. To dispel the misguided comment about uplighting—that "We don't work on the ceiling!"—I believe that the best example of why uplighting is important is represented in the experience of an industrial concern that was doing a remarkable job in relighting an area in its plant. The company proceeded under the accepted technique. The results were as calculated. In proceeding with the relighting, the company was asked to examine the possibility of using uplighting in its next group of

luminaires. The company installed the luminaires with uplighting and then stood back to marvel at the amazing increase in the comfort of the area and the difference in the feeling about the area. The next question, obviously was, "Were they losing any light on the work surface?" By actual measurement, everyone agreed that there was no difference.

Further, they agreed that had there been any decrease, the improvement in comfort would have justified adding fixtures to make up the difference. Again, we are more comfortable because of the lack of any great difference of light in our field of vision.

Another advantage of uplighting is that the apertures in the fixture help to vent the fixture for better cooling of the lamp. But in doing this, there is an additional advantage found. The dust-laden air moves *through* the apertures in a "chimney" effect, not allowing the dirt to settle on the lamp and reflector. Many tests (see curves) have been run to prove this, as its importance to fixture maintenance is obvious.

In calculating any lighting installation, we must consult the lamp catalogs to determine the light output of the lamp we wish to use. Consideration should be given as to the type of fluorescent lamp, the length of lamp and the color of the lamp. The type depends on the amount of light we wish to produce in a fixture and the length is largely determined by ability to use either 4-foot or 8-foot lamps. Choosing the color lamps has a varied reaction when discussed by a group. To a degree, the choice depends on the



These curves indicate relationship of accumulation of dirt to time for four types of reflectors commonly used in industrial plants. A glance will bear out the appreciable difference in cleanliness for the different types of reflectors and emphasize value of "uplight" luminaires as well as the importance of periodic cleaning for most efficient results.

"Standard cool white is the predominant choice . . ."

material on which we are working. Someone working on brass may prefer a different choice of color than one working on silver. The choice of lamp color is wide, ranging from so-called *daylight*, which is predominantly blue, to *deluxe warm white* which is high in red. The most popular choice in lamps today are the *standard cool* or *standard warm white* lamp, with the names indicating well the nature of the color. Standard cool white is probably the predominant choice in the shop because of its crisp white appearance, whereas standard warm white is a popular choice in an office because of its more pleasing effect on skin tones, while maintaining its

rank as the highest in light output.

Help in laying out lighting for effective seeing is everywhere just waiting for a word from any manufacturer—large, medium or small. Printed matter is available from lamp and fixture manufacturers to guide the designer. As in any study, the material would involve a considerable amount of time to digest and then apply. One very definite product of such research would be, however, that you would have a better appreciation of the "why's" and "wherefore's" of lighting, and then be in a better position to tap the other resources of help. All reputable fixture manufacturers maintain a lighting service through



BEFORE: At the onset of a clean-up program, the medium inspection room shown in this illustration was painted; however, fixtures remained glaring examples of poor lighting.

their salesmen who, as a requirement to their job, are competent lighting men and members of the Illuminating Engineering Society. These men all have lighting fixtures in all price ranges and will endeavor to custom-fit their lighting recommendations.

Another source of help that is available to virtually all manufacturers is the trained personnel of the commercial and industrial sales departments of the electric utility. These people are schooled in lighting and gain much experience in laying out lighting installations for all types of manufacturing. Their knowledge of the industry allows them also to tap outside sources if necessary for specialized lighting techniques. Oftentimes the utility conducts a lighting school of its

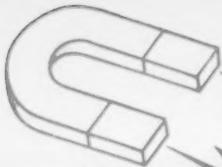
own, inviting industrial engineers, managers, electricians and maintenance men to them for demonstrations, talks, films, practical layouts, and plant tours.

The help is available—test it if you will by picking an area or department in your plant in which lighting right now is either extremely poor or in which you would like to see the lighting conditions improved for a particular task. An experimental section will give you the opportunity to test what good lighting can mean to your particular business. Others have been doing this and are spurred on to proceeding as fast as production schedules will permit.

Lighting will work for you—its wages are small, but it produces. Give it a chance to prove its worth.



AFTER: Another step in improvement program was the installation of new louvered high-output rapid-start fixtures. Results accelerated program for future plant improvements.



MAGNETIC HOLDING

**Case histories showing how magnetic clamping
is saving operator time and effort
on production machining jobs.**

By FRANK L. SUCHANEK
Sundstrand Corporation

Although magnetic chucks have been useful accessories to various machine tools for over sixty years, they have recently taken on new stature as a means for clamping. The electromagnet provides the tool engineer with control of magnetic forces and fewer limitations in his fixture design. It is also a simple matter to provide safety interlock so that the machine cycle will not start or feed unless the holding force has been applied and fully effective.

The first factor considered when

magnetic clamping is proposed as a production tool is the saving of time and effort on the part of the operator. This, of course, is paramount on any job if a high level of productivity is to be maintained.

In Fig. 1 an operator is shown loading a rectangular bar against alignment stops and clamping the part to the machine table with three straps and bolts. Lights attached to the operator's wrist trace his motions as he completes the clamping of the part; for purposes of photography, all tools, straps, bolts and

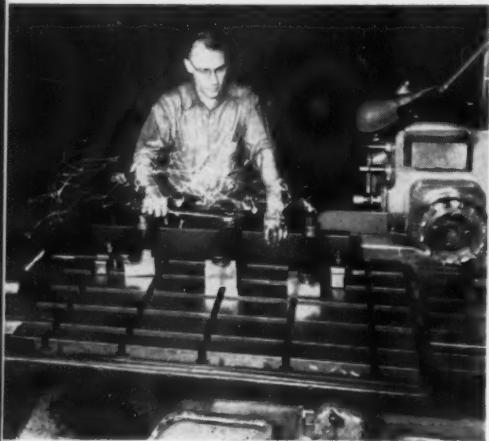


Fig. 1—Motion study: loading and clamping a part with the aid of bolts and straps.

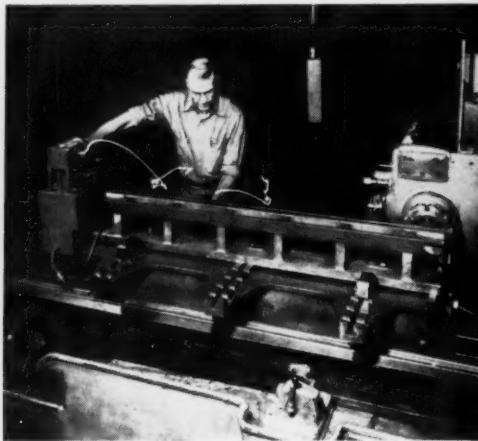


Fig. 2—Motion study: loading and clamping a part on a magnetic type milling fixture.

Fixtures on Machine Tools

spacers were conveniently available on the machine so that the motions pictured here are those used to tighten the bolts.

In Fig. 2 the operator is shown loading this same part onto a magnetic milling fixture. Again the motions have been traced by lights on the operator's wrists. The saving in time and effort is obvious. When faced with a production problem in which loading time is greatly in excess of cutting time, a magnet may be the answer.

Our firm has built several milling machines equipped with a heavy-duty trunnion fixture which include a magnetic chuck 12 feet long for the producers of heavy shear knives. In Fig. 3, we see a 50-horsepower mill equipped with this fixture which cut loading and clamping time by 75 percent, as compared to

the time required with the previously used method.

This user also reports greatly improved cutter life as well as an increase in speeds and rate of feed. This is an important benefit derived from magnetic holding which should be carefully considered.

When a piece part is clamped by magnetic force, theoretically, every molecule of ferrous material throughout the workpiece is influenced by magnetism. The holding forces are uniformly distributed throughout the piece part. This uniform distribution of holding force means less vibration in the piece part, which sharply reduces "chatter," thus resulting in improved cutter life.

To further take advantage of the magnetic holding force, we strive to take the thrust from the table feed

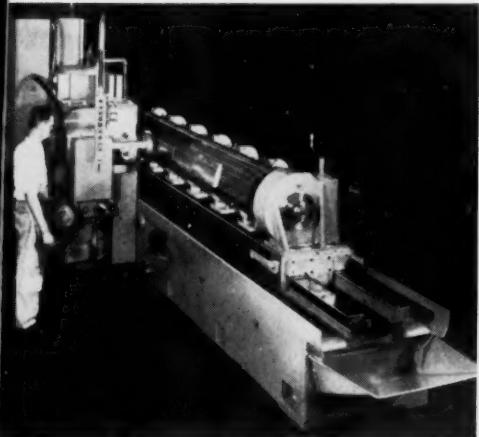


Fig. 3—A 12-foot-long magnetic trunnion fixture installed on a 50-horsepower Rigidmil.

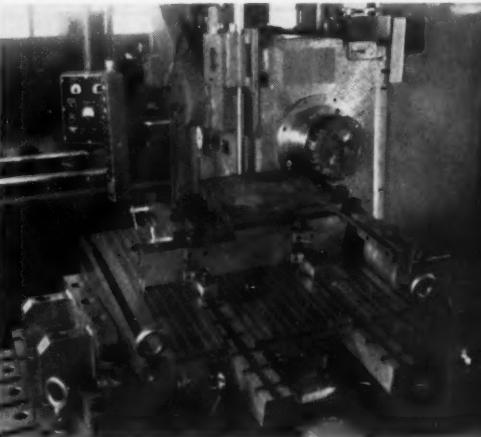


Fig. 4—Milling die blocks on a magnetic fixture with a 50-horsepower Triplex Rigidmil.

"Magnetic holding is available in horizontal and vertical planes."

and the cutter against a mechanical stop which is *not* attached to the magnet frame. By arranging a fixture in this manner, it permits the magnet to function more effectively as a registering device with a maximum of rigidity.

In Fig. 4 we see a second 50-horsepower mill equipped with a magnetic fixture used to face mill all sides and ends of die blocks. The mechanical stop to align the piece and the stop for the thrust are independent from the magnet frame.

Control of the magnet in both of these machines is from the machine pendant. Interlock is provided so that the feed motor cannot be energized unless the magnet is on.

Another type of production problem is one in which a magnet eliminated an accuracy problem and improved loading and clamping time. Illustrated in Fig. 5, a combi-

nation magnetic and mechanical fixture is used to do all the clamping operations on a transmission housing. Magnetic holding is available in both horizontal and vertical planes and the part is milled on a special Triplex Rigidmil. The job was originally held with four tunnel-type mechanical clamping fixtures. The heavy clamping pressures necessary to properly hold the piece caused it to distort. When clamping pressure was released, the top and ends of the housing were not flat within required limits.

An ideal holding arrangement was achieved by locating this housing by two dowels in the horizontal magnet and then adjusting the vertical magnet until it registered against the side surface. Distortion was no longer a problem, and parts were milled within 0.0005 T.I.R. for parallelism. This performance is

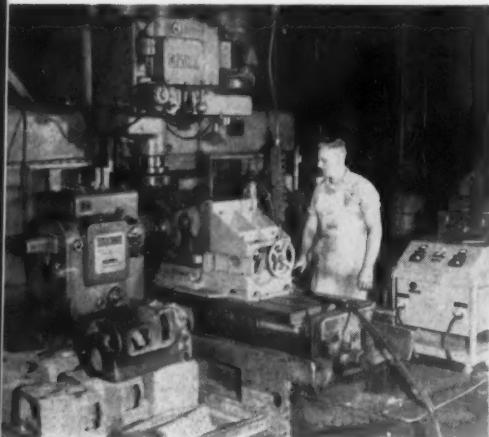


Fig. 5—Milling transmission housings on a magnetic fixture with a Triplex Rigidmil.

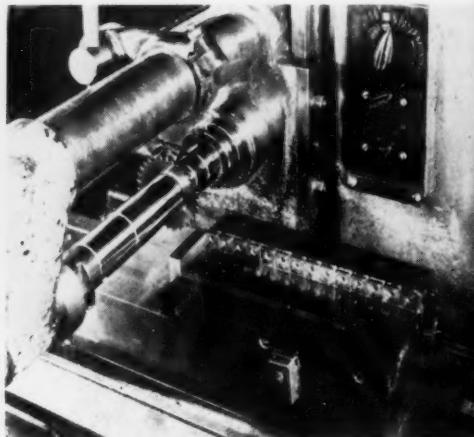


Fig. 6—Close-up showing the slotting of 14 small parts on a special magnetic fixture.

excellent for workpieces this size.

In this case it is noteworthy that the customer preferred to have all of the control elements for the magnetic fixture in a portable control station which was independent of the machine pendant control.

In the previous illustration shown, the parts have been relatively large, and it is a well-known fact that small parts have always been a problem to hold satisfactorily on a magnet. This is due to the fact that holding power is proportional to the mass of the piece part. Therefore, a small part will always be more difficult to hold.

In Fig. 6 is shown a small part measuring $\frac{5}{8}$ by $\frac{5}{8}$ by $\frac{5}{16}$ inch through which it was necessary to cut a slot 0.090 inch wide and $\frac{1}{2}$ inch deep. The part was originally held in a vise which did not grip the part properly and frequently pinched the slotting cutter. By proper arrangement of the magnetic poles so that the holding force was

directed through one side and bottom surface of the part, a maximum of tractive force was achieved. The fixture handled 14 parts per load with a feed rate of 13 inches per minute. Even though 23 percent of the total mass of the part was removed in this slotting cut, the parts were properly held and cutter life between sharpenings averaged 30,000 parts or approximately 2,140 cycles.

In another instance, another small part was almost impossible to clamp properly and meet production requirements. This piece is a refrigerator valve plate, a Meehanite casting that is $\frac{3}{8}$ inch thick, $\frac{21}{2}$ inches wide and 2 inches high. As shown in Fig. 7, both sides of the part were face milled in a reciprocating milling cycle; the operator loads one fixture while the other is in the cut.

Control of the magnetic fixture is through trip dogs on the table which activate limit switches. Two transformer-rectifier units were used

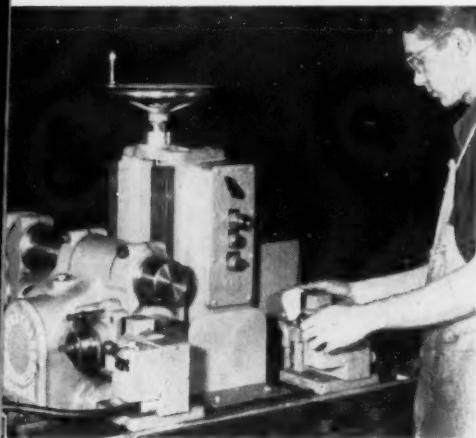


Fig. 7—Milling small, thin castings by reciprocal cycle on two magnetic fixtures.

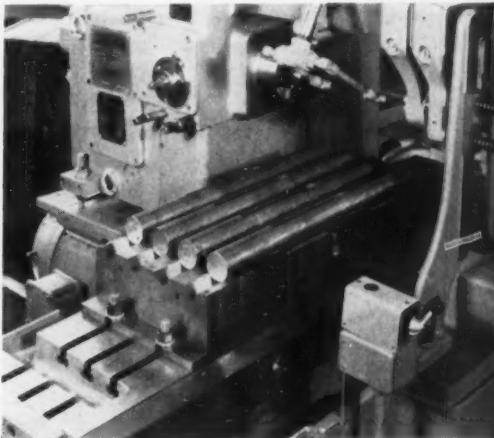


Fig. 8—Close-up showing the keyway milling of various shafts on magnetic vee fixturing.

"No clamps are used whatsoever . . ."

so that control of each fixture was independent of the other. Production averaged 170 parts per hour at 85 percent efficiency.

Milling keyways in various shaft sizes and holding them in magnetic vee fixtures is another popular application for this holding method. In Fig. 8 the cutter and arbor have been removed to provide an unobstructed view of the complete fixture. No clamps are used whatsoever. The operator lays the shaft in the vee and registers it against the end stop which is mounted on the machine table. Keyway cuts are made by climb milling with automatic rise and fall movement of the head. The vee fixtures have flame-hardened surfaces and are finished as matched sets. These fixtures are attached to standard magnets which are wired in parallel. The vee fixtures can be easily removed and another set attached to accommodate various diameter shafting.

Savings are realized in this type of tooling in several ways; first, a smaller diameter cutter can be used since no clearance over

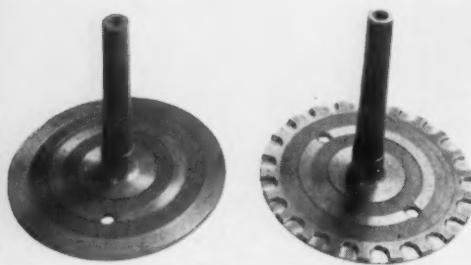


Fig. 9—A thin section metal part: a total of 22 slots is end milled in the flange.

mechanical clamps is required; second, the shafts can be grouped closely together so that more parts per machine cycle can be handled on a machine of a given width. To cite an example, the machine in the slide has a 10-inch table; four 1 1/4 inch diameter shafts are easily held. Savings are also to be expected in improved cutter life and higher production with less operator effort.

In Fig. 9 is shown an unusual magnetic holding application for a part of thin section. The part was 18 inches in diameter, turned all over, with two cord holes; the base of the stem was finished bored. The operation was to end mill 22 slots around the top surface of the flange and to hold the depth of the slots within plus or minus 0.0005 inch with respect to the bottom of the flange.

The fixture was applied to a vertical milling machine, Fig. 10, fitted



Fig. 10—Vertical mill with magnetic index fixture for holding the parts shown in Fig. 9.

with a rotary magnet, mounted on a standard index base. The part was loaded over a pilot in the center and located radially from a pin into one of the holes. Production averaged 19 pieces per hour at 80 percent operator efficiency.

Rotary chucks receive their electrical supply through the use of collector rings and brushes. We prefer to use a compound arrangement of brushes with two pairs of brushes in parallel to insure the d.c. supply. In the case of the index fixture, the brushes and collector ring are concealed in the base supporting the index fixture.

In Fig. 11 is shown a production lathe fitted with a rotary chuck for various facing and boring cuts on a clutch plate. Direct current is supplied to the magnet by a collector-ring brush assembly mounted at the rear of the headstock spindle. The wiring is through the spindle in conduit to the center of the magnet.

The three top plates and the piece part held by each plate for the lathe

illustrated in Fig. 11 are shown in detail in Fig. 12. These plates are inexpensive to fabricate and the operator can change them on the base magnet in less than five minutes. The magnet is fitted with a hard pilot bushing in the center; the top plates have a hardened pilot in the base to accurately maintain concentricity of the fixture elements.

Obviously, of course, we have discussed only a few of the profitable uses for magnetic fixturing. There are many places for magnets in improving the productivity of machine tools; for example, they can be very useful in handling parts automatically in loading and unloading machines. They can be used to advantage as accessories to conveyors and other special applications. It is important also to observe that maintenance and operating personnel become familiar with magnetic equipment and soon learn to get the most out of it. It can be a powerful, versatile piece of equipment when applied properly.

The foregoing was presented as a paper at the 23rd Annual Machine Tool Electrification Forum sponsored by the Westinghouse Electric Corporation, Buffalo, New York.

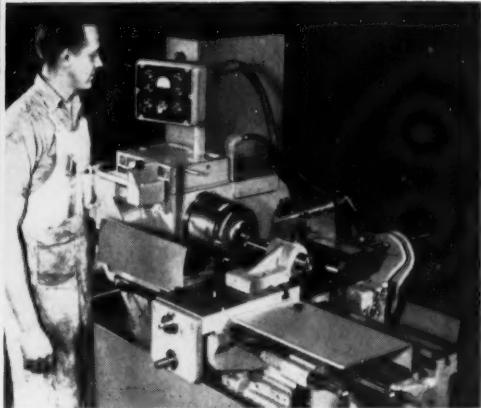


Fig. 11—Rotary chuck on production lathe designed for boring and facing clutch plates.

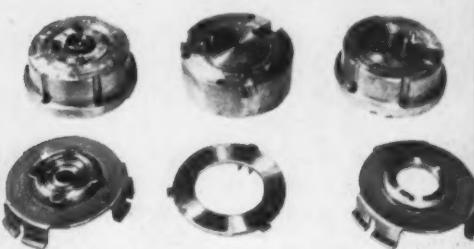
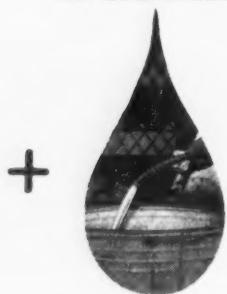


Fig. 12—Interchangeable top plates (and respective piece parts) used on lathe in Fig. 11.

"Summer Odor" from



SOLUBLE OIL



WATER



PSEUDOMONADS

...can be controlled

Nearly everyone has experienced the "rotten egg" smell of spoiled soluble oil emulsions. Here's what causes it . . . and how you can control it with Elcide 75.

THE CAUSE: The oil-and-water mixture of a standard-duty soluble oil emulsion produces ideal feeding conditions for certain bacteria. One of the most common types, *pseudomonads*, can be found in all emulsions. Once established, they multiply rapidly . . . especially in warm weather . . . and feed on the emulsion.

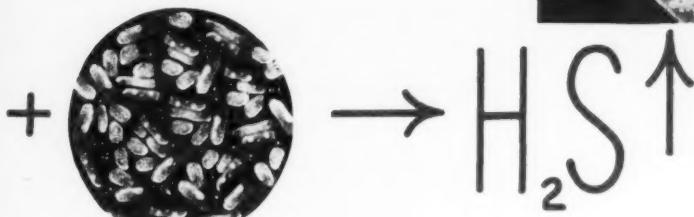
As these pseudomonad colonies build up, they set the stage for a secondary contamination by sulfate-reducing bacteria. These bacteria feed on the petroleum sulfonates commonly used

as the emulsifying agent in soluble oils. As they multiply, they throw off H₂S, the hydrogen sulfide gas known in the industry as "summer odor."

Unfortunately, the damage from bacterial contamination does not end here. As the odor develops, the bacteria continue feeding on the emulsifier until the emulsion breaks. This process changes the mixture from alkaline in composition to corrosive acid. Other by-products from the bacteria form a slime that clogs screens and filters, and presents certain hygienic hazards.

Eli Lilly AND COMPANY • AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION
For more data circle 403 on Postpaid Card

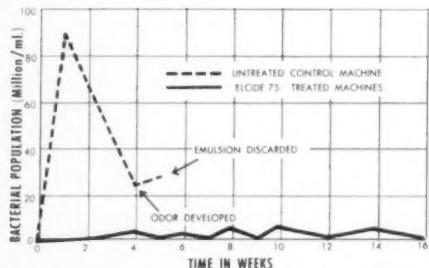
rancid emulsions



SULFATE REDUCING
BACTERIA

(SUMMER ODOR)

with ELCIDE 75



This plant-test record shows bacterial build-up in an untreated emulsion. The downward curve is where secondary contamination by the sulfate-reducing bacteria starts final destruction. The Elcide 75-treated emulsion lasted 5½ times longer.

THE CURE: ELCIDE 75 hits this problem at the first stage of bacterial growth. Because Elcide 75 is a new, wide-spectrum inhibitor, it attacks and controls a wider range of bacteria, and the mutants which frequently develop. Just one ounce of Elcide 75 in

each 4 gallons of fresh emulsion breaks the vicious cycle of bacterial growth before it starts . . . thereby greatly extending the life of your coolant.

ELCIDE 75 is a reliable way to prevent the waste of frequent emulsion changes. Its wide range of anti-bacterial action insures a constant control that not only prevents "summer odor," but also reduces production costs. Many plants have thoroughly tested Elcide 75. They found Elcide 75-treated emulsions last far longer, reduce downtime and oil concentrate costs, and increase total productivity.

If you have not yet tried Elcide 75 in your plant, we urge you to try it now . . . before the heat of summer further inflates your personnel problems and operating expenses.



INDIANAPOLIS 6, INDIANA
TELEPHONE: MELROSE 6-2211

LET AN AUTHORITY TELL YOU



How to Solve Your Supervisory Problems

By **ALFRED M. COOPER**

Contributing Editor, *Modern Machine Shop*

Q. What is the unique function of the supervisor in dealing with labor relations problems?

A. This is a question that is often raised, both by management and supervisors, whenever industrial relations matters are being discussed, either in executive seminars or supervisory conferences. It is agreed almost at once that the supervisor probably can exert little influence in the setting up of wage schedules, except in those instances in which his recommendations regarding promotions or pay increases carry weight, and this fact is recognized as an integral part of the personnel policy of the company.

In most industrial organizations, and even in some governmental bureaus, the recommendations of an immediate supervisor are carefully considered in determining who shall receive promotion to a job that pays higher wages. (Under civil service employment the ambitious worker must further pass a promotional examination before stepping up to a

better-paying classification.) In both private and public employment seniority and the general personnel record of the employee are given consideration, along with the supervisor's recommendations. The degree to which these recommendations determine promotions is the main differentiation between private and governmental employment.

For some years there has been a tendency in many large corporations to bring personnel policies more in line with those that have been traditional in governmental employment ever since civil service was established. Thus, seniority may become increasingly important; results of various types of aptitude tests are accorded greater weight; and personnel routines, as distinguished from the considered opinion of the supervisor, may well become the deciding factor in determining promotions.

Having served at various times in both publicly and privately owned organizations as personnel execu-

*For answers to your perplexing managerial problems address your letters to:
Mr. Alfred M. Cooper, MODERN MACHINE SHOP, 431 Main St., Cincinnati 2, Ohio.*

tive, I am not at all sure that any routine which weakens the supervisor's prestige with his subordinates is a good thing, and certainly this cannot be true under private enterprise. It probably works equally poorly in a governmental bureau, but there the possibility of revising personnel routines is almost nonexistent, except when the intent is to make them even more mechanical of application.

The effect of any personnel routine which serves to detract from the supervisor's authority is that of forcing this bossman to adopt soft, indirect tactics in getting things done in his section, rather than to depend upon direct orders. Here is an instance of soft supervision:

Recently I sat in at a conference conducted by the office manager of a group of civil service workers. It happened that the supervisor was about 35, while the youngest among his group of women employees was well over 50. The supervisor opened the meeting with what appeared to me a remarkable preamble, which began, "Now listen, kids."

I later found the supervisor was quite proud of this opening phrase, and really felt it flattered the matrons every time he could work it in. But when I mentioned the matter to one of the employees she said, tartly, "For heaven's sake who does he think he is fooling! We all know the youngest among us is old enough to be his mother—and so does he! Naturally, we don't pay much attention to *anything* he says after that."

This is one weakness of any manifestation of soft, wheedling supervision. It results from the supervisor's awareness of his inability to get results by simple issuance of

orders, and the following up of these to be sure they have been obeyed.

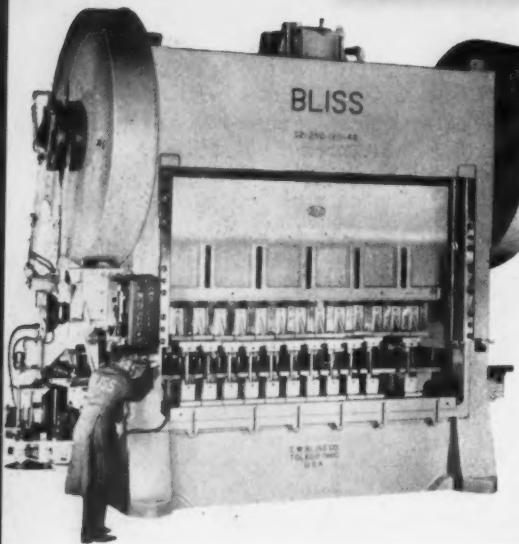
Q. Can soft supervision ever improve worker morale and industrial relations?

A. The chances are against this. Improved worker morale and bettered labor relations may be considered interchangeable terms. Weak supervision inevitably sets up an unhealthy supervisor-worker relationship, in which the essential factor of *respect of the subordinate for his boss* is missing.

Q. Is there anything the supervisor can do to remedy matters, once he finds he must work under conditions that make soft supervision imperative?

A. Management in most industries has repeatedly gone on record as favoring all practicable steps that will strengthen the supervisor's position as an integral part of management. Whenever personnel routines creep in which inadvertently operate to take away some of the authority of the foreman or office manager this fact should be brought forcibly to the attention of management. When it is thus emphasized that such a routine may be detrimental to industrial relations the practice may be more minutely scrutinized at a rehearing.

The supervisor's most valuable contribution to improved labor relations can be made only when he is boss man, confidant, and advisor to his subordinates. That perennial smile on the face of Nikita Krushchev must become a bit broader every time he notes the personnel routines within American private industry moving a bit closer to those in effect within the various bureaucracies throughout the world.



The Modern Transfer Press

(Left) Large Bliss transfer press equipped with individual press dies.

The first installment of a comprehensive discussion on the operation and use of transfer presses.

By ERNEST J. URBAS

Like the man on TV sez, "It's what's up front that counts. If it hasn't got it there—it hasn't got it." If he was talking about a transfer press he would say—"It's got it there—there—there—and there. It isn't only 'What's up front that counts'—it's front, top, side, back, inside and underneath." Yes, this type of press has really got it.

"What," you ask, "is a transfer press?" A high falutin description goes something like this: As the name suggests, it embodies a special type of punch press into which a series of individual press dies are mounted which produce the work-piece from raw material to finished product; the said workpiece is transformed by its being transferred by

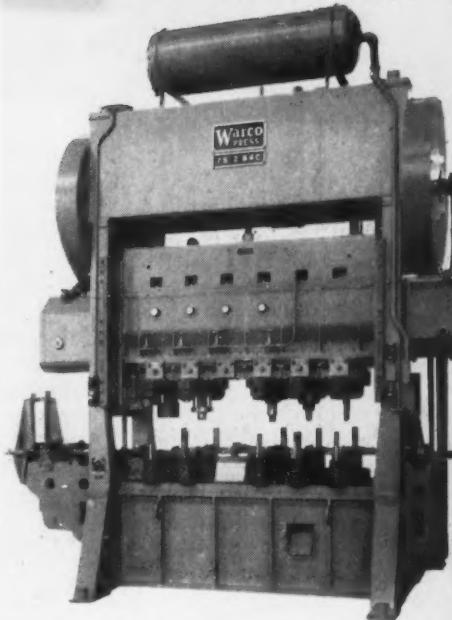
a mechanism from station to station throughout all the stations or operations to its completion. (Now, to confuse the "thinking man".) This description fits the family of presses that travel under such confusing names as multiple plunger, eyelet, cam plunger, cam eyelet, cam roller eyelet, stepped die press, or under such intriguing names as "Transflex" and "Transmat." (If you have been bearing with me, let me unconfuse you.) These names may be descriptive of mechanical action or they may be names indigenous to a locale, but nevertheless the presses to which these names apply are all members of the transfer family. Get it? Got it? Good.

In the beginning, the transfer

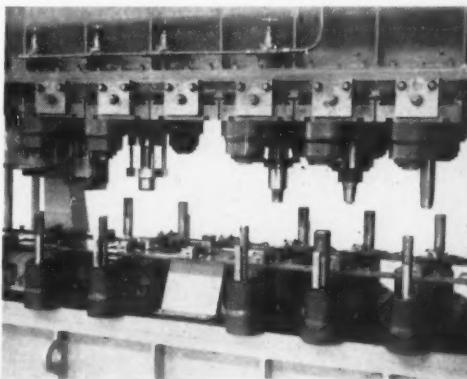
press was conceived out of a necessity to produce eyelets for the shoe industries. These miniature stampings were practically impossible to pick up by hand and process through single operation dies and when you consider that a hundred or more of these eyelets were used in a single pair of shoes or corset, the requirements must have been voluminous. Consequently, a method had to be evolved to produce the miniature parts. Some people still refer to the small transfer presses as eyelet machines to this very day.

Gradually, the presses were built larger to accommodate large workpieces that were required in large quantities. Because manufacturers jealously guarded their secret of manufacturing, highly specialized industries were established in the East that were built around the ability to produce transfer stampings. Unknowingly, those stampers who avoided transfer presses were doing so because of their ignorance of the technique. They didn't realize that transfer tooling was of the simplest nature—the method was basic and the developed operations were the simplest possible.

The early machines produced parts of a round nature only because the mechanical slave fingers were not practical in the positioning of a rectangular or odd shape. It wasn't until recent years that the transferring mechanism was revolutionized to successfully and precisely advance rectangular shapes. With this advancement the transfer presses began to be built to colossal proportions undertaking to produce almost any type of stamping, whether it be large in size or deep in depth of



Warco "automated" double-crank twin-drive double back geared transfer press equipped with ram incorporating power adjustment and an adaptor which operate as a single unit for use in producing aluminum tumblers.



(Above) Close-up view of Warco transfer press showing dies used in drawing aluminum tumblers. (Below) This view shows operational sequence in producing aluminum tumblers.



"...the transfer press doesn't goof-off."

draw. From this point on, the transfer press has moved in the foreground as the best manner in which to produce most large stampings that require a number of operations, and are to be produced in a routine or continuous manner.

With labor and material costs up in the clouds, the trend is to attempt to produce more and better stampings by the transfer method. Further stimulating the transfer technique is the fact that products must reach the market in a hurry, and in quantities.

Yes, the transfer press doesn't goof-off. You don't have to police toilets and corridors; it just keeps running by itself.

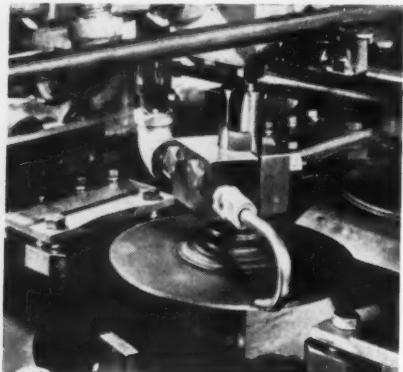
Stay with it, men, the meat of the article starts here. The transfer press excels in the production of drawn shapes, whether they be round, oval, or rectangular, principally when a large number of operations are required to complete the

workpiece. The transfer press is also practical in the production of two dimensional shapes such as flat metal parts or parts with a relatively minor deviation from metal thickness.

The most important feature of a transfer press is that the workpiece can be worked on the edge after the clipping or trimming operation. The normal type of press work (progressive dies) generally permits a part to be produced up to and including the clip, trim, or blanked-out operation, after which subsequent presses are required to perform additional operations on the edge. Such operations as curling, notching, threading or beading are performed with ease in a transfer press after the edge is trimmed.

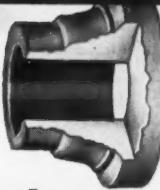
Many methods are available for feeding the raw material into the first station of the transfer press. The raw material may be in the form of coil stock, developed blanks, or predrawn cups. The various methods used to feed the raw material are roll feeds, belt feeds, magazine feeds, gravity feeds, slide feeds, hopper feeds, stack feeds, and friction dial feeds. The selection of the raw material feeding method on a particular job is based on the most economical use of the transfer press, shape of the part, the number of pieces to be produced, and the speed with which they must be produced to maintain schedules.

The determining factor in the selection of the type of press to be used is the number of operations required to complete the workpiece. The transfer press can only perform



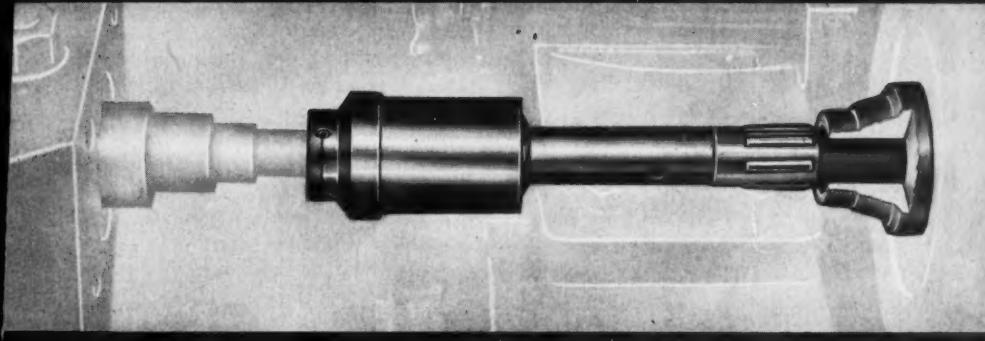
Mechanism used to transfer workpiece from station to station throughout all operations.

from 125 to 5 micro-inches



*surface
finish*

in one 5-second pass!



*with the revolutionary **microlle** burnishing tool*

- Finishes roughest bored or turned surfaces (ie: 200 mu-in. and higher) to finishes of 4 micro inches and lower.
- Finishes in one pass at feed rates of 8 to 12 inches per minute. A one inch length in 5 seconds!
- Finishes all machineable metals . . . all types of surfaces; internal and external cylindrical . . . tapered, radial, flat.
- Use tool in any machine . . . on any drill press, engine or turret lathe as a secondary operation . . . or right on the screw machine or automatic where other operations are performed! No special equipment needed.

ADJUSTABLE FOR SIZE CONTROL

- Sizes in increments of .000025" or less . . . performs sizing operations never before possible. Invaluable for sizing bearing seats, oilite bushings, parts out of tolerance, etc.
- Run thousands of parts without tool wear. No stones to replace. Highly hardened rolls and tip last for thousands of parts. Tool maintains size setting . . . no adjustment necessary. Wearing parts replace-

able. Simplest setup and operation . . . no skill required.

- Stock shipment in popular sizes. Tools and replacement parts available from stock for off-the-shelf delivery.
- Refined, improved surface, a new concept. Tool marks and surface imperfections are rolled out. Grain structure is condensed and compacted . . . workhardened and refined; fatigue properties are improved. An ideal, wear-resistant, surface results . . . free of damaging abrasive grit inherent in honing or grinding.
- The top twenty companies in the metal working field . . . plus more than a thousand others have replaced costly finishing and sizing methods with the Microlle burnishing tool. In actual case histories, finishing costs have been cut by 90% . . . production rates increased by eight and nine times.
- Results guaranteed: The Microlle is backed by Madison-Faessler's 80 years of experience in producing cold rolling tools . . . and is sold on a results guaranteed basis. Sales and service representatives in all principal cities.

*Write for
further
information*

MADISON-FAESSLER TOOL CO.
Dept. MM7, Box 1137, Providence, R. I.

For more data circle 405 on Postpaid Card

*(Affiliated
with
Madison Industries)*

"... an amazing record of pieces may be produced."

that number of operations for which there are punch holder settings or plungers in which the punches are mounted or secured. If the transfer press does not have enough punch holder settings to produce the part completely, you have these four alternatives:

(1) Redesign the finished part to suit the capabilities of the transfer press, which in many cases is the sensible thing to do.

(2) Redesign one or some of the operational dies so that an operational die performs the work of two dies. If you have enough stations in your transfer press, use them. Keep your operations simple. However, don't get carried away with simplicity when a workpiece requires an additional operation and your transfer press doesn't have enough tool setting stations.

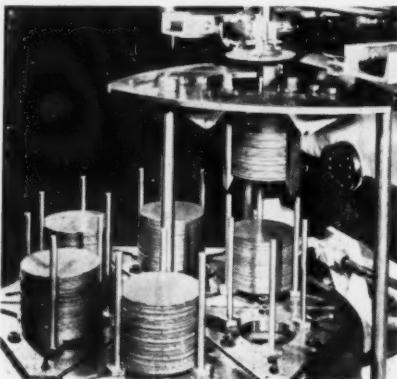
(3) Purchase a transfer press with enough operational tool slides so that the workpiece can be made in one press.

(4) Produce your blanks prior to the transfer press work and feed the blanks into the transfer press. *This technique will provide you with the gain of one operational tool setting.*

Usually, the mass production of large stampings requires that developed blanks be fabricated on a press independent of the transfer press, the reason being, that generally, the blanks are simple in contour design which permits the building of a simple "drop-through" type of die that will produce the blanks in multiples; that is, more than one with each stroke of the press. The

reason for blanking in multiples isn't so much that you produce more pieces per stroke in the press; the important thing is that the blanks are interlaid in such a pattern that the scrap left after punching is reduced to a minimum. The savings that result by the use of the interlaid multiple layout more than offsets the cost of the preliminary operation.

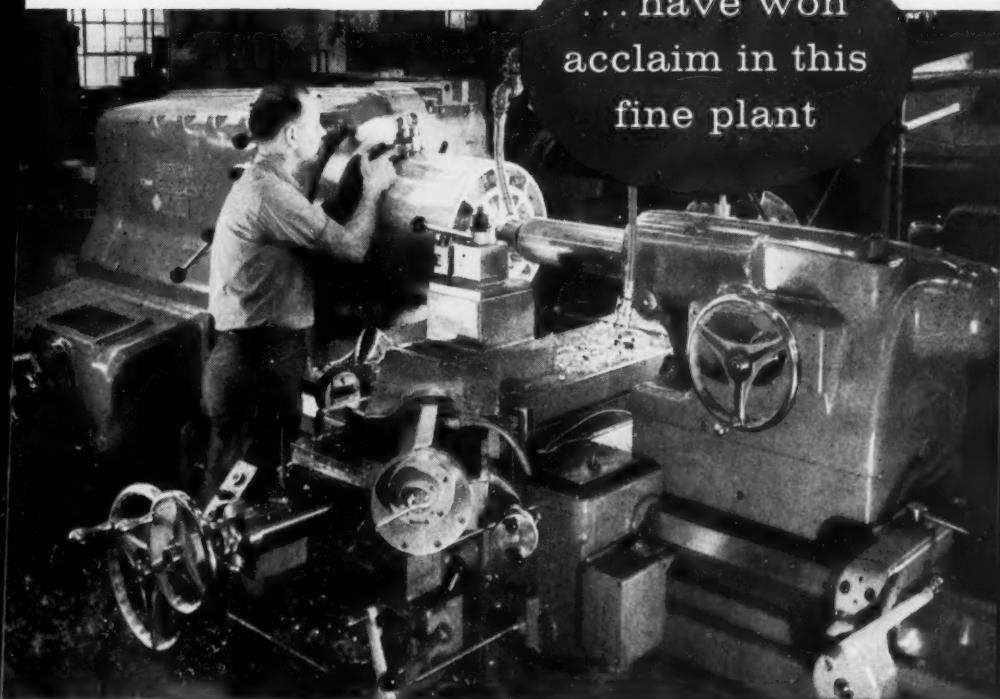
The paramount reason for feeding precut blanks to the transfer press is that maximum productivity is achieved. You can see that when precut blanks are fed to the transfer press, it is possible to engage the transfer press stroke in full automatic operation and, without stopping the press once, operate it during the full course of a day's operation. Consequently, an amazing record of pieces may be produced. Don't be deluded by the relatively slow strokes per minute of some of the larger machines for they



"Stack feed" for the completely automated feeding of precut blanks to transfer press.

"American" TRACER LATHES

... have won
acclaim in this
fine plant



Bulletin
No. 135

gives a complete description
and shows many examples.
It's yours for the asking.

The Mechanical Division of General Mills, Inc. in Minneapolis, Minnesota uses "AMERICAN" Tracer Lathes for their contouring work. 17 years of ordnance and instrument work have conclusively demonstrated to the General Mills officials that only the highest quality equipment can produce the precision work that their contracts require—result "AMERICAN" selection.

More production per man hour is the answer and only answer to spiraling costs—modern, high production machinery is the answer to greater production per man hour. Judging from reports, the Mechanical Division of General Mills, Inc. has found this to be true.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U.S.A.

LATHES AND RADIAL DRILLS

For more data circle 406 on Postpaid Card

Modern Transfer Press . . .

turn out an amazing number of pieces in a week, month, or year. If I have learned anything in my long record of diemaking experiences, I have learned that it's not what you make in a minute that counts as much as how many you make in a day, in a week, or in a month.

Another instance where precut blanks should be made in an independent press is in the case where the total capacity of the transfer press is not large enough to cut the blank and also perform the subsequent operations. Therefore, smaller transfer presses can often be used because of the elimination of the high tonnage that is normally required for blanking jobs.

If you decide to feed precut blanks to the transfer press, you might consider the purchase of these precut blanks from the mills that specialize in this type of work. These mills have the capacity and equipment which you might lack to efficiently handle large coils of material; they have presses in which to make your blanks, and they can expertly dispose of the tremendous amount of scrap that piles up in high speed blanking.

SEIBERT FLOATING HOLDER

Compensates For Misalignment Of Tool And Hole

- ECONOMICAL
- CONVENIENT
- EFFICIENT
- Continues to Float Freely when Tool is at Work

This holder, one of a long line of SEIBERT fine machine-tool accessories, provides a full float to compensate for misalignment of hole and tool when such operations as drilling, tapping, and reaming are performed. It also provides for holding close tolerances, it eliminates much downtime, and it permits quick tool changes. The float in all directions is not hampered by friction or binding in the driving mechanism when the tool is at work.

HEAVY-DUTY DESIGN ASSURES LONG LIFE

The heavy-duty design provides extra bearing capacity to assure long life, and the positive lubrication practically eliminates wear and parts replacement. All types of shanks are available in a range of sizes, including an adjustable adapter shank.

Send for complete specifications and price information.



SEIBERT & SONS, INC. 1001 E. 24th STREET

CHENOA, ILLINOIS

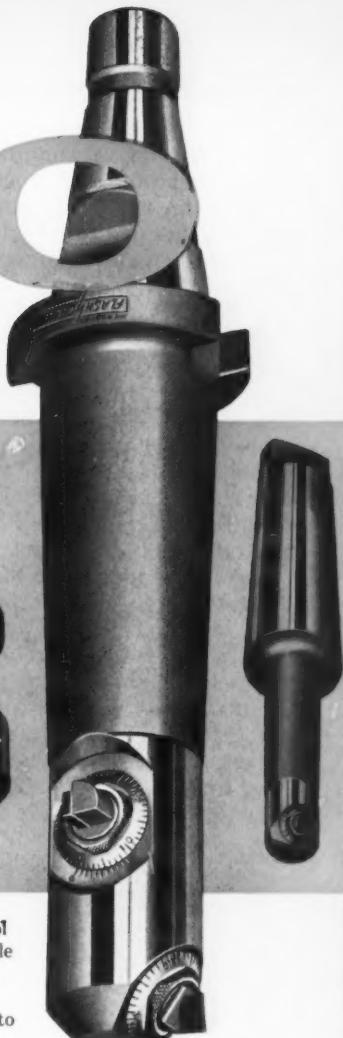
Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

For more data circle 407 on Postpaid Card

now... over

330

standard Microbore
boring bars from stock!



Your choice of over 330 Microbore standard single-tool or two-tool precision boring bars. A complete range of sizes and types available for boring and facing operations on any make of boring machine, milling machine or turret lathe. *Microbore micrometer vernier adjustment of each tool point makes it possible to quickly set tools to precise dimensions.* Boring range from $\frac{1}{2}''$ to $7\frac{1}{4}''$ dia. Standard Boring Rings and Adapters extend range to $13\frac{3}{4}''$. Available with Straight Shank, NMTB Taper, Morse Taper or Flash-Change. Carbide, ceramic, or high speed steel cartridges. Ordering is Simple! Fast! Direct! Standardize on Microbore—the complete tooling system.

Catalog No. 58 lists industry's most complete line of standard general purpose precision boring bars. Write for your copy.

Also available—special tooling designed from your part prints by our Proposal Engineering Department.

DeVLIEG  **MICROBORE SYSTEM[®]**

DEVLIEG MICROBORE

• DIVISION OF DEVlieG MACHINE COMPANY

Fair Street, Royal Oak, Michigan

For more data circle 408 on Postpaid Card



"...feeding is accomplished by completely automated mechanism."

rial ready for consumption on the press. In addition, you pay cartage charges on only that material used in the piece-part instead of freight charges on material of which a large portion ends in waste scrap.

The actual feeding of precut blanks is accomplished in one manner by a completely automated feeding mechanism which is fastened on either the right or left side of the transfer press frame. This mechanism is called a "stack feed," for stacks of precut blanks are hand loaded into nests which are provided on a rotary or turret table. This turret table indexes so that a nest of blanks is positioned directly below the feeding machine.

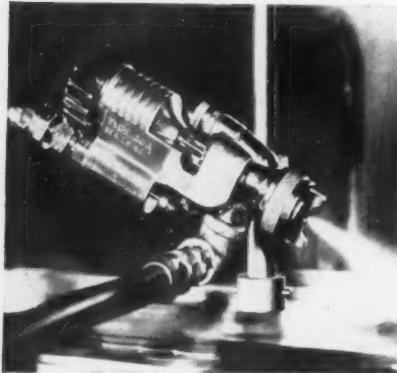
The magazine is reloaded when the blanks in it reach a predetermined level, at which time a plunger, below the turret table, lifts a stack of blanks and refills the feeding magazine. The magazine holds the stack of blanks by means of a

number of hooked fingers which were pivoted out of the way by the force of the edge of the blanks against the angular entry provided on the fingers. After the blanks have been completely lifted past the hooks of the fingers, they snap under the last blank of the stack and then the lifting plunger retracts. The turret table then indexes to bring one of the filled nests in position for the next loading of the magazine feed when the blanks in it arrive at the predetermined loading level; at the same time the empty nest has indexed to a position where it may be refilled with blanks. If these precut blanks are round, they are commonly referred to as "cookies."

All of these movements of the stack feed, the turret feed, lifting plunger, and the feed magazine are controlled by a number of limit switches that not only control the operating function but also check as to whether the operating function was properly performed; if it was not, the machine will stop.

The precut blanks are lifted out of the magazine by a vacuum cup or cups which receives its up and down motion from a cam or eccentric yoke which is mounted on the extension of the main crankshaft. When the vacuum cup has picked up a blank and begins to elevate, a blast of air from a positioned tube will blow off any other blanks that may have adhered to the blank that is being lifted by the vacuum cup.

When the blank has been lifted to the maximum point, the transfer mechanism moves in and grasps the



Mist type spray gun specially designed for coating surface of work with drawing oil.

OA

9" column 3'-4' arms

1A

9"-11" column 3'-4'-5' arms

3A

13"-15"-17" column 4'-5'-6'-7' arms

4A

19" column 6'-7'-8' arms

5A

22"-26" column 7' to 12' arms

For more data circle 409 on Postpaid Card

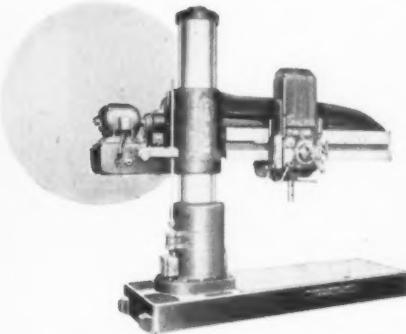
July, 1959

Carlton

*specialists in
radial drills*

Carlton has specialized in radial drill research, engineering and manufacturing since 1916. Our close contact with—and intimate knowledge of industry's drilling requirements—have produced a wide line of the most modern and up to date radial drills. Made in arm lengths from 3-ft. to 12-ft., column diameters from 9" to 26". Programming, pre-select and manual speed-feed controls, plus special bases, tables, and jigs available for additional productivity. For further information, send today for free descriptive bulletins.

The Carlton Machine Tool Co., Cincinnati 25, Ohio.



"...these evils could cause extensive damage to dies..."

blank and shuttles it to the second station, releases the blank, and moves back to its starting position during the cycle of the stroke. Simultaneously, the transfer mechanism is grasping the part in each of the other individual stations and transferring it into the succeeding station. When the blank is being moved to the second station, the surface is being coated with a drawing oil which is sprayed on by a mist type spray gun which has been developed for just such applications. This does away with the general unsightly appearance of a "gooky" press. It really saves oil.

The second station is often provided with a limit switch setup that checks the blank thickness or the possibility of double blanks. Either of these two evils could cause exten-

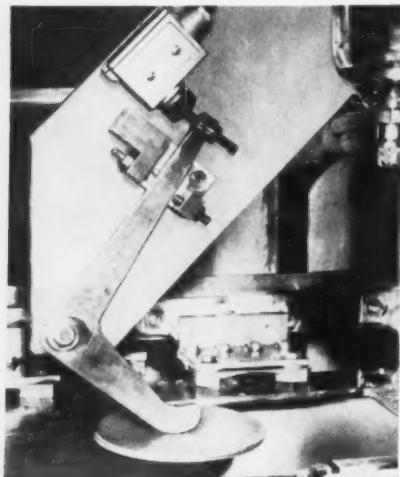
sive damage to the dies or press, but the safeguard limit switch stops the press. In more elaborate security, the limit switch would open a trap-door and the double blanks or over-gauge parts would fall through the trap into a receptacle beneath the press. This type of security permits the press to continue without stopping, for no harm can be done if a part is not carried through the transfer stations.

Another type of stack feed shuttles the blanks in a straight line movement from two points instead of a rotary movement as is performed by a turret type. Although more simple in design than the rotary type, it appears to be more adaptable to odd-shaped blanks. Naturally, more vigilance must be employed to see that the stacks are loaded because there are only a few nests.

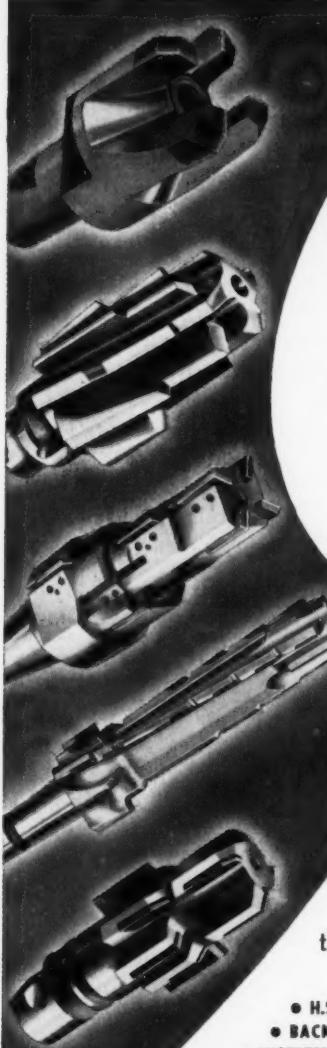
All rotary turret stack feeds are not as automated as those previously described; some are hand operated. That is, the turret is rotated by hand and the blanks are raised out of the nests by a hand cranked elevator. This type of feed requires an occasional stopping of the press for the loading of the feed magazine.

Still another type of stack feed removes pre-cut blanks from beneath the stack by a vacuum cup. This type is simpler in design than the rotary type and has proved quite successful. Here again, more vigilance is required to keep the magazine loaded. Blanks can also be removed from beneath the stack by means of either a cylinder or cam-actuated push rod.

(To be concluded in next month's issue)



Type of safeguard limit switch that is arranged to open a trap door so that double blanks fall into receptacle beneath the press.



Eclipse

CUTTING TOOLS

are

"Engineered for You!"

For almost half a century ECLIPSE has engineered and produced quality cutting tools. These years of leadership in the field guarantee the superiority and dependability of all ECLIPSE products. For longer tool life, finer finishes and better all-around performance, look to the symbol of perfection.



- H.S.S. CUTTERS • T.C.T. CUTTERS • CORE DRILLS
- BACK SPOTFACERS • MULTI-DIAMETER CUTTERS
- INSERTED BLADE CUTTERS • PORT CONTOUR CUTTERS

WRITE FOR CATALOG 51



ECLIPSE COUNTERBORE COMPANY

1600 BONNER AVE., DETROIT 20, MICHIGAN

For more data circle 410 on Postpaid Card

July, 1959

modern machine shop 139

Special Chamfer Grind Solves Tapping Problem

"Bottleneck" in producing gear transmission housings broken by simple tap alteration.

By RALPH B. PETERSEN

Sometimes a stock tap just will not do a job satisfactorily. If wear is the primary problem, special surface treatments for the tap may solve the problem. At other times, the tap supplier must rely upon his extensive experience in problem-solving and develop a tap that is special in one respect or another.

Recently, Standard Tool Company engineers found it necessary to develop a special chamfer grind for a difficult production operation that had created a real bottleneck in an Ohio manufacturer's plant. The modified chamfer was combined with a special surface treatment for wear resistance.

A multiple-spindle trunnion-type drilling and tapping machine had been purchased to machine a gear transmission housing. The part was made of SAE 1020 hot-rolled plate, dead soft. Originally, the housing had been drilled and tapped on a radial drill. Although production was less than 100 pieces per month, the radial drill crew worked continuously to keep up.

The new drilling and tapping machine was purchased with the expectation of running out the month's requirements in one or two days. Unfortunately tool troubles

occurred from the start, so much so that acceptance of the machine was held up until troubles could be solved and output was satisfactory.

The tapped holes ranged from $\frac{3}{8}$ to $1\frac{1}{4}$ inches in diameter. Although most of the operations were troublesome, the real bottleneck was a $1\frac{1}{4}$ -7 bottoming tapping operation. In the soft material, the stringy chips clogged the tool, teeth chipped, and taps broke. The taps were loading on both the flutes and the thread flanks. Poor thread finish resulted from the loading, chipping of the tap chamfers, and the characteristics of the metal. On the average, less than 12 holes could be tapped before the tools had to be removed. While drills were a minor problem, chip clogging was noticed.

Called in on the job, Standard engineers gathered some pieces of plate from which the weldment was made and took them back to their laboratory. The first change was to increase the included angle of the drill point from the stock 118 to 135 degrees to eliminate chip clogging. The flatter point raised drill life to a satisfactory level, broke up the stringy chips, and gained hole depth and chip room for the tap. Then, the clearance on the tap chamfer was

increased to provide a freer cutting action. That change resulted in some improvement in surface finish of the cut thread. But tap breakage was still too great. A heat treatment was employed to improve the toughness of the tap and further reduce tendency to load. This resulted in a considerable decrease in galling and welding, and some decrease in breakage and chipping—but not enough. The employment of a special chamfer grind completely solved the problem.

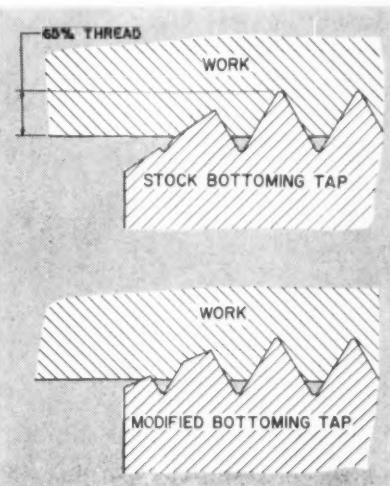
A group of taps was made up incorporating these three special features and trials were run at Standard plant. The bottoming tap averaged well over 100 holes with no detrimental effect on the taps. All holes were satisfactory. At this point, the lab testing was stopped and the taps were tried by the customer. The field tests substantiated the lab findings.

The new tools were put into production immediately. The machine was accepted and production is satisfactory. The tools are functioning without trouble. As in many cases involving special taps, tooling costs to the customer remained unchanged.

The tap alteration that broke the bottleneck involved only the chamfer of the tool. Like all tap suppliers, Standard uses $1\frac{1}{2}$ threads for the chamfer of a regular bottoming tap, the small diameter of the chamfer slightly below root diameter. Since the tap has four flutes, only six teeth are available to do all the cutting. On this job, the hole to be tapped was drilled to provide 65 percent of thread. Therefore, a considerable portion of the chamfered

threads was doing no work and the chip load was extremely excessive on the remaining portion of the chamfer. A great amount of the load had to be carried by the first full thread with only four cutting teeth.

By simply changing the angle of the chamfer and increasing the diameter of the small end to a point just below that of the drilled hole, each cutting surface on the chamfer then was doing a full job with the cutting spread over the full six teeth. The new design of the cutting teeth reduced the chip load per tooth and the cutting torque required, increased tap life (by reducing wear and breakage), improved surface finish, and gave more holes within size limits per tap grind. These benefits in turn led to less down time for tool changing, fewer broken taps, longer runs between tap resharpening, and lower costs.



Modified chamfer grind for bottoming tap reduces chip load per tooth by spreading the load over a maximum number of teeth.

more
production
through
moderniza-
tion

more production through modernization

**Techniques for increasing output with
newly developed machines and tools.**

Automatic Drilling-Tapping Machine Saves Handwheel Production Time

Introduction of a two-way automatic-sequence horizontal drilling and tapping machine into the production of valve handwheels has resulted in a 23 percent time savings at the Orbit Valve Company, Tulsa, Oklahoma. Equipped with a speed indexer, the machine automatically drills and taps two holes 180 degrees apart.

The machine, manufactured by The Morris Machine Tool Com-

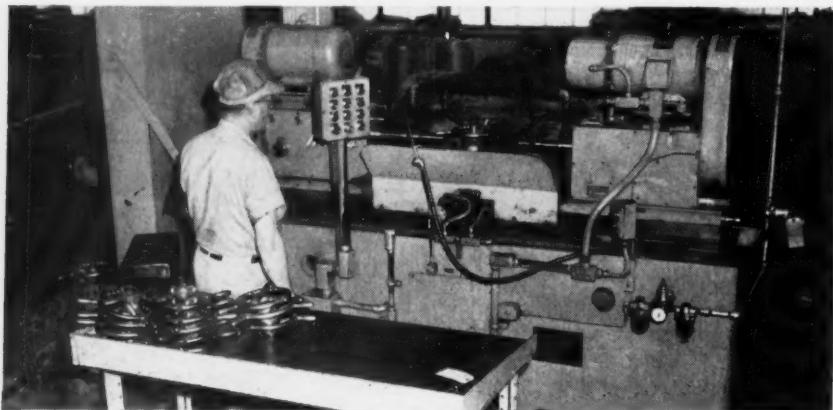
pany, Cincinnati, Ohio, consists of two Morris No. 2 Cam-Matic drill units mounted horizontally opposing each other on a common fabricated steel base, with the indexing unit in the center. One Cam-Matic unit is for drilling and countersinking, the other for tapping.

The sequence of operations performed on the handwheels is as follows:

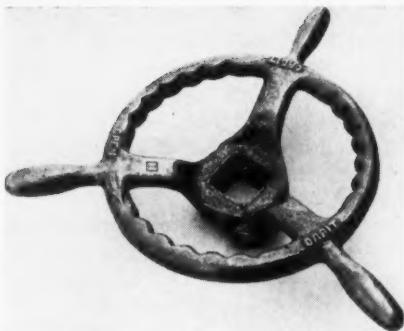
Operation No. 1—Load part in fixture and clamp.

Operation No. 2—Press cycle start button.

Operation No. 3—Unit No. 1 rapid



Automatic drilling and tapping machine used at Orbit Valve in producing valve handwheels.



Close-up of handwheel drilled and tapped in automatic drilling-tapping machine setup.

approaches, drills to depth and rapid returns. Unit No. 2 is idle. Operation No. 4—Fixture automatically indexes 180 degrees.

Operation No. 5—Unit No. 1 rapid approaches for second hole, drills to depth and rapid returns. Simultaneously, tap in Unit No. 2 rapid approaches first hole, tap feeds to depth and returns, tap rapid returns to starting position.

Operation No. 6—Fixture automatically indexes 180 degrees.

Operation No. 7—Unit No. 2 tap rapid approaches second hole, tap feeds to depth and returns, tap rapid returns to starting position. Unit No. 1 is idle.

Operation No. 8—Unclamp and unload part.

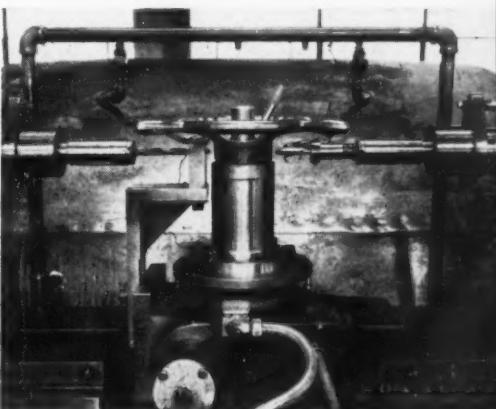
Production rate of the automatic two-spindle machine is 320 parts in an 8-hour period. This is a 23 percent time-saving over the previous method, which used two separate operations with 4-spindle drill press.

The two holes in the handwheel are drilled $27/64$ inch in diameter and tapped $1\frac{1}{2}$ -13 N.C. Spindle speed of the drilling spindle is 730 r.p.m. with a feed rate of 0.009 inch

per revolution. Spindle speed of the tapping section is 370 r.p.m. with a feed rate of 13 threads per inch. Both units have a 6-inch stroke.

The Morris cam-fed drilling units are especially applicable for use in the production of the malleable iron handwheels, because they offer automatically controlled operation cycles, adjustable thrust control to suit the material being machined, and a wide range of spindle speeds for either drilling or tapping. The Cam-Matic units utilize a heavy machine cam to provide forward motion to the quill. The periphery of the cam determines the rate of quick approach, the drilling time, the length of stroke, and the rate of rapid return. The units are automatically cycled. Mechanical devices, traveling with the quill, trip limit switches to end the cycle or to reverse the quill travel and spindle rotation for tapping operations like those at Orbit Valve.

Compact size of the units is due to the employment of an electric clutch. An adjustable rheostat per-



Close-up of tooling and workpiece setup.

more production . . .

mits sending varying amounts of current to the clutch for effective adjustable thrust control. The amount of thrust desired is simply dialed with the rheostat. Should the drill units encounter an obstruction, the electric clutch slips, preventing damage to the unit and to the workpiece. Adjustment for thrust just beyond the maximum required sets up the clutch to function as a dull drill detector.

For the Orbit Valve operation, the Cam-Matic units are mounted on 6-inch sliding sub-bases for easy setup, and equipped with self-contained automatic lubrication. The fixture section is equipped with an air cylinder for holding the part, as well as a complete chip and coolant discharge facility.

For more data circle 1 on Postpaid Card

★ modern machine shop ★

Milling Cutter Change Cuts Tool Costs

Rough and finish milling in one pass has been achieved by modifying a 10-inch Kennamill. The results obtained in face milling cast steel housings include greatly reduced machining time and a reduction in tool costs to approximately one-fourth of former costs for a mid-western manufacturer of farm equipment. These benefits were effected by changing the type of milling cutter and the grade and types of throw-away cemented carbide inserts. The changes were made because of frequent breakage of inserts which slowed production.

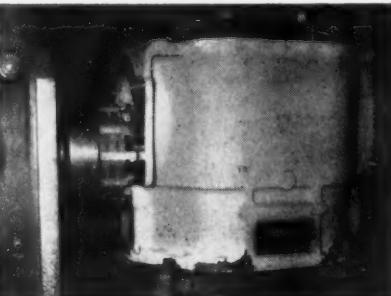
The present milling cutter is an

"Odd Job" Kennamill which holds 12 Kendex toolholders. Modification consisted of deepening alternate slots for toolholders by $\frac{1}{4}$ inch. Six finishing tools are clamped in these slots so that they project about 0.030 inch beyond the six roughing tools in the other six slots.

The six finishing toolholders are Kendex Style KRAR-12 with round button inserts, and the six roughing toolholders are Kendex Style KSBR-12 with square button inserts. Grade K4H Kennametal is used in all inserts.

Tool cost per piece was reduced from \$2.87 to 79 cents. Due to previous frequent breakage of inserts, only 16 castings could be milled per set of ten inserts. Thirty-two castings are now milled per set of 12 inserts with the new tooling setup. The milling operation is being performed at the same surface-foot rate of 390 s.f.m. and same depths of cut— $3\frac{1}{16}$ to $5\frac{1}{16}$ inch for roughing and 0.025 to 0.035 inch for finishing—but feed was increased from $5\frac{5}{8}$ to $7\frac{1}{4}$ i.p.m. A 20-horsepower Cincinnati H.P. No. 5 machine is used for the job.

For more data circle 2 on Postpaid Card



Roughing and finishing cuts on cast steel housing for farm machinery were completed in one pass with the Kennamill shown here.

AUTOMATIC COMPENSATION FOR MISALIGNMENT WITH EMPIRE FLOATING TOOL HOLDERS AND TAP HOLDERS

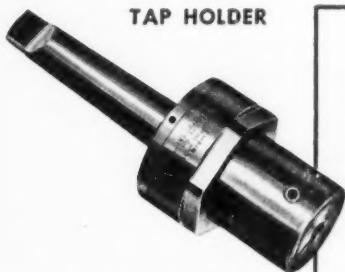
Check These Exclusive Empire Floating Tool Holder Features:

- Automatically compensates for both angular and parallel misalignment.
- Eliminates bell mouthed and over-sized holes—permits extremely close tolerance work.
- Free and easy movement . . . tool holder sleeve and shank float independently of each other.
- Amount of float is infinitely adjustable.
- Smoother running . . . moving parts ride on rollers.
- Minimum of maintenance . . . holder has only five parts.

TOOL HOLDER



TAP HOLDER



Standard equipment with leading Machine Tool Manufacturers. Tool Holders and Tap Holders are available with either straight or tapered shanks.

Check These Exclusive Empire Floating Tap Holder Features:

- Automatically corrects parallel and angular misalignment.
- Designed to prevent freezing under tension—taps float in and out.
- Wide range of float—simple adjustment lock-nut provides accurate control of degree of float.
- No springs or pivot members to restrict float.
- Floataion feature makes it easier to hold close tolerances.

EMPIRE TOOL COMPANY

11503 LAMBS ROAD • MEMPHIS, MICHIGAN

For more data circle 411 on Postpaid Card



Queen City

HEAVY DUTY

• GRINDERS • DISC GRINDERS and BUFFERS
We know what goes into these Grinders and Buffers! That's why we can make this offer.

Point for point — you just can't beat QUEEN CITY Heavy Duty Disc Grinders and Buffers. Built to stand up under hardest use . . . heavy duty motors deliver full horsepower. Wheels, guards, switches, cords, eyeshields are of highest quality . . . selected to deliver long, trouble-free service.

Choose from a complete line of floor or bench types . . . in sizes from $\frac{1}{2}$ to 10 H.P. and buy them for 20 to 30% under competing makes. Try them for 30 days on money-back guarantee!

**QUEEN CITY
MACHINE TOOL CO.**

write for
FREE CATALOG
TODAY!

3911 KELLOGG AVE.
Cincinnati 26, Ohio

"Known for Quality for Over 50 Years"
For more data circle 412 on Postpaid Card

more production . . .

Cylinder Sleeves Honed Automatically

Complete automation in the honing section of a cylinder sleeve production line was achieved by the use of a BarnesdriL Model No. 307-2 vertical type honing machine and a special fixture assembly. Three manually loaded and unloaded single-spindle honing machines were previously used to attain the production quota. By incorporating a two-spindle reciprocating head and completely automatic load and unload mechanisms on the No. 307 honing machine, operator attendance was reduced to a minimum while maintaining the production quota.

The cast iron cylinder sleeves are honed at the rate of 144 parts per hour at 80 percent efficiency. In honing, 0.002 to 0.004 inch of stock is removed from the fine bored hole to produce geometric accuracies of less than 0.0005 inch for roundness and taper and bore sizes consistently within 0.0007 inch tolerance. A 25-35 r.m.s. finish is applied to the 3.150-inch I.O. by 5.393-inch long bore of the cylinder sleeve.

The BarnesdriL Model No. 307-2 vertical type honing machine is arranged with twin cylinder hydraulic reciprocation and controls for infinitely variable reciprocation rates from 10 to 75 feet per minute. Included in the two-spindle reciprocating head are electronic hone expansion and Plugmatic automatic bore-to-bore sizing. BarnesdriL electronic hone expansion on the No. 307 honing machine features



MOSTLY—

THEY TALK ABOUT OUR NEW

PORTELVATOR®

THE HANDY HAMILTON PORTABLE ELEVATING TABLE

It
**LIFTS
LOWERS
POSITIONS
TRANSPORTS**
 all compact, heavy loads!

FOUR
POINT
SUPPORT



Top plate locks by gravity at any attained height when hand-crank pressure is released.

EASE OF MOVEMENT
SAFETY
INHERENT IN DESIGN

FIVE STANDARD MODELS
(capacities to 5,000 pounds)



Write for FREE LITERATURE BATCH No. P-800

THE HAMILTON TOOL COMPANY
828 SOUTH NINTH STREET • HAMILTON • OHIO

For more data circle 413 on Postpaid Card

LOOK FOR THIS SIGN



for fast, dependable

service on

- hand hack saws
- power hack saws
- band saws
- hole saws
- hammers
- ground flat stock

LOOK FOR THIS SIGN



for fast, dependable

service on all your

industrial needs.

Patronize the Distributor
who displays both.



THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

For more data circle 414 on Postpaid Card

148 modern machine shop

more production . . .

automatically-controlled rapid expansion and collapse, electronically measured and infinitely adjustable hone feed, automatic compensation for stone wear and individual feed for each spindle. Plugmatic sizing control units allow independent spindle honing action until bore size is reached.

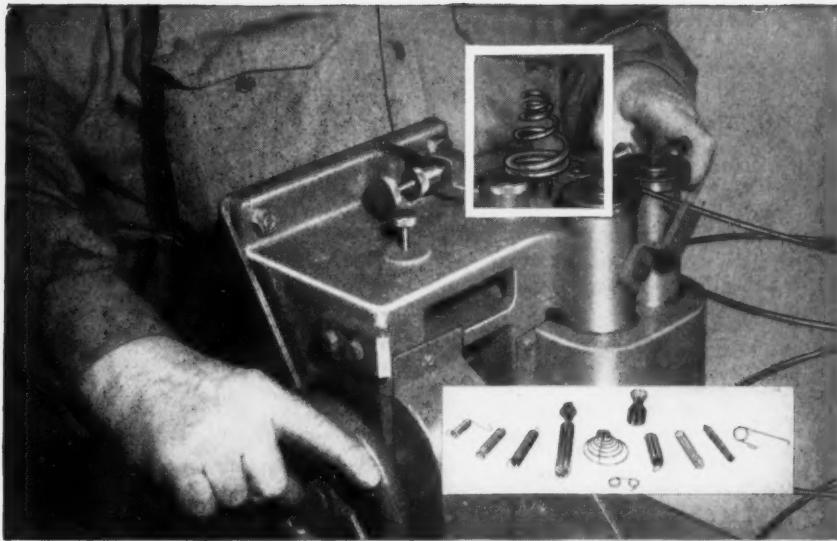
The Barnesdrill hydraulically-operated automatic fixture assembly controls are electrically interlocked with machine controls to reduce operator functions and minimize cycle time. Accidental misplacement of parts or interruption of supply will cause immediate shut-down of the machine.

A two-position rotary index table 18 inches in diameter is mounted on a non-adjustable fixture table. The fixture table also supports two clamping mechanisms and the transfer carriage assembly.

The index table rotates through 180 degrees and is equipped with four fixture sub-assemblies with full floating compensating adapters. Limit switches control the positioning of the table, with exact positioning assured by positive stops. Two clamping brackets on vertical slides are cylinder actuated through lever systems to hold the thin-walled part rigidly in true position without distortion.

In one complete cycle, the following motions occur: The parts are supplied upright to the short conveyor extension which holds three parts in magazine fashion. A proximity pick-up senses the presence of the part, and a cylinder-operated pusher block moves the part on a

July, 1959



Any spring made fast in your shop! WITHOUT USE OF ARBORS

For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32" to 12" and larger, with or without initial tension, and with

open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!



Starrett adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.



PERKINS

MACHINE AND GEAR CO.

Special Machinery Division,
West Springfield, Mass.

Perkins Machine and Gear Co.
*Special Machinery Division, Dept. D2
W. Springfield, Mass.*
Please send information and prices on
Perkins Spring Coiler.
Hand Model Power Model

Name.....Title.....

Company.....

Address.....

City.....State.....

For more data circle 415 on Postpaid Card

more production . . .

90-degree angle to the adjacent loading channel and retracts to receive another part. A second cylinder-operated pusher block moves the part to a predetermined position in the channel. When cylinder No. 2 retracts, another part is pushed into position by cylinder No. 1 which retracts to receive third part. Signals from the proximity

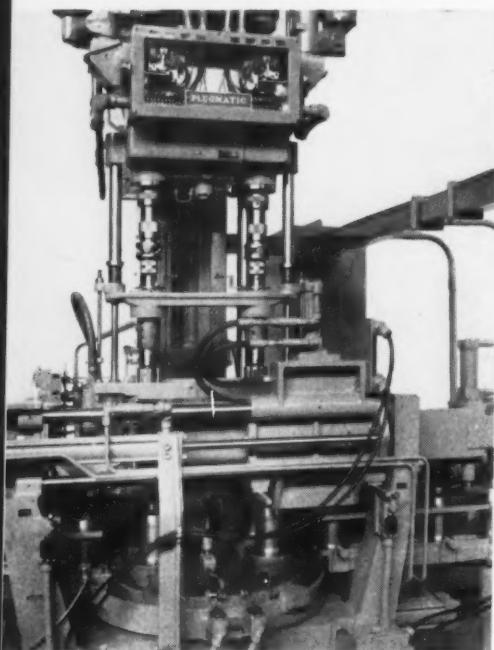
pick-ups now indicate proper loading conditions.

The transfer carriage has now moved from the extreme right to the extreme left position by cylinder actuation. There are seven hydraulic cylinders mounted on the transfer assembly, five of which are placed on a horizontal pick-up bracket supported on a vertical slide in the transfer carriage. Four pick-up mandrels suspended from the pick-up bracket are spaced in pairs equal to the fixture center distance. The two mandrels situated on the left carry un honed work-pieces only.

The pick-up bracket lowers, positioning the mandrels in the bores of two un honed parts and two previously honed parts. The mandrels expand to grip the parts. The pick-up bracket rises with the parts and a cylinder-actuated pusher block descends from the right end of the pick-up bracket to position. This pusher block removes the honed parts from the discharge channel which must be absolutely clear in order to receive the next set of honed parts.

The conveyor carriage moves to the extreme right position, simultaneously clearing the discharge channel of honed parts. The pick-up bracket lowers, positioning the un honed parts in the locating collars of the fixture bases and the honed parts in the discharge channel. The mandrels collapse, releasing the parts. Spring clips engage a shoulder on the honed parts in the discharge channel to prevent accidental return of the parts. The pick-up bracket now moves up to clear the parts.

The honing cycle begins auto-



Barnesdril Model No. 307-2 vertical type honing machine arranged for two-spindle reciprocating head and incorporating electronic hone expansion, twin cylinder hydraulic reciprocation and Plugmatic bore-to-bore sizing. The hydraulically operated pneumatic fixture assembly includes an 18-inch diameter two-position rotary type index table, as well as loading and unloading mechanisms.

matically when the parts are clamped. If a part is not in place or fixtured properly due to part irregularities, the honing cycle will not begin until the operator corrects the situation. During the honing cycle, the conveyor carriage moves to the extreme left to repeat the loading cycle.

At no time during normal operation is the operator required to do anything other than change the honing stones when indicated on the control panel. The control panel is arranged for either manual or automatic operation.

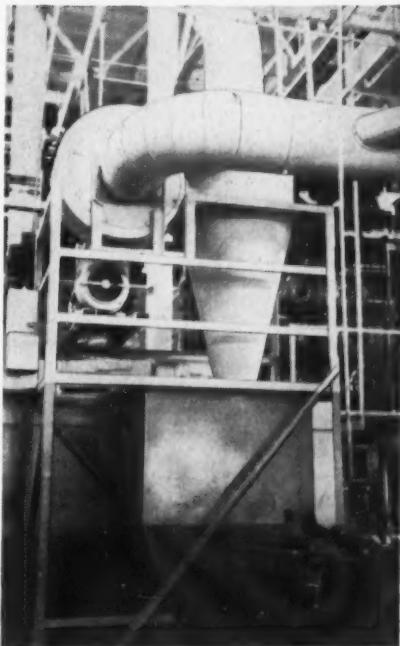
For more data circle 3 on Postpaid Card

★ modern machine shop ★

Overhead System Provides for Effective Dust Collection

The accompanying illustration shows only one grinding machine with a dust collector system behind and above it, but it is indicative of the overall job recently completed by Aget Manufacturing Company, Adrian, Michigan, for a large manufacturer of automotive parts. Flexibility is a must in a plant of this nature. Aget was called in to replace an ineffectual, outmoded collection system with one that would fit the needs of a factory that was involved each year in extensive production line changeovers.

Dustkops specifically designed to handle each group of machines—grinding, polishing, buffing, woodworking—were installed overhead, both to conserve floor space and to facilitate emptying. Tote trucks can be backed in at any time to take the collected dust from the storage

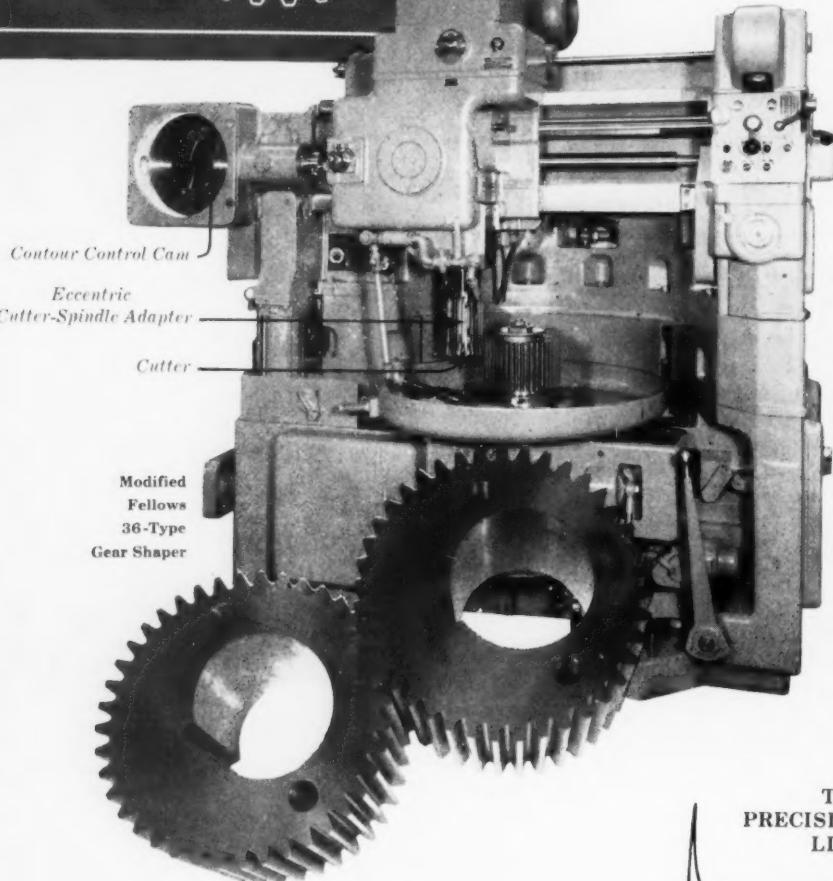
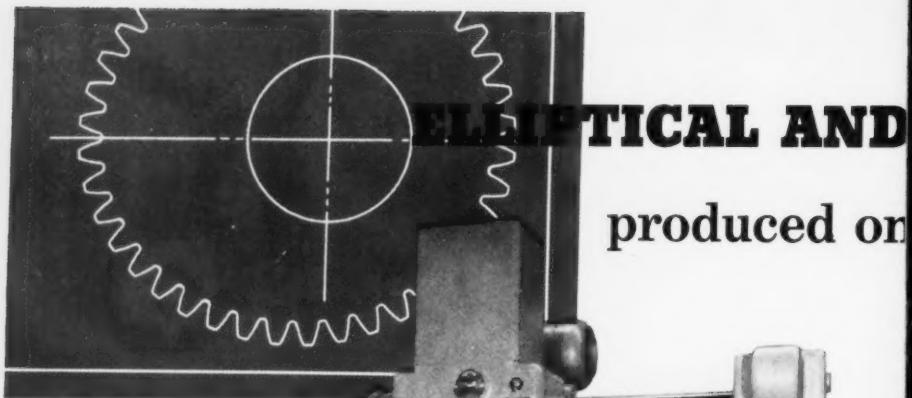


View showing portion of overhead system installed in auto part manufacturer's plant for improving dust collecting operations.

hoppers. But most important is the fact that each collector is an integral part of the units it serves. When the machines and the connecting piping are moved, the Dustkop goes right with them.

Nearly eighty Dustkops, ranging in size from 500 to 10,000 c.f.m., were involved in this installation, some of them for new applications, some to replace outmoded collectors. According to the Aget field engineer who supervised the job, the manufacturer credits this new system with vast improvements in plant working conditions, maintenance and overall efficiency.

For more data circle 4 on Postpaid Card



THE
PRECISION
LINE

OVAL GEARS

Fellows 36-Type Gear Shaper



Now...you can generate accurate oval and elliptical gears, and other irregular shapes, rapidly and economically. Once setup is made, production is as simple as in cutting conventional cylindrical gears. This new method minimizes the difficulty of wide variations in backlash experienced with such gears cut by previous methods. Full or modified involute teeth are produced to a higher degree of accuracy than was ever possible before on gears of this type.

Oval and elliptical gears are produced by continuously varying the center distance between cutter and gear during the cutting operation. A contour cam (above) and a follower move the saddle the required amount in timed relationship with the rotation of the eccentric cutter-spindle adapter. The required pitch line contour of the gear is determined by the control cam and the eccentric adapter.

Although the Modified 36-Type Gear Shaper can be used to produce conventional external gears up to 18" pitch diameter by substituting a cylindrical cam and concentric cutter adapter, it is primarily a special purpose machine for oval and elliptical gears. Special stroke parts are required for cutting face widths from 6" to 10". For full information, get in touch with any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

Fellows Gear Production Equipment

For more data circle 417 on Postpaid Card

ideas
from
readers

ideas from readers

Several time-saving ideas and suggestions for the man in the machine shop.

Hex Nuts Make Useful Rethreading Dies

By H. J. GERBER

Nut dies, used extensively by mechanics for the rethreading of burred, battered or tight threads, can be quickly and economically made in a shop possessing a set of simple keyway broaches. The dies are made by broaching, in an arbor

press, a number of approximately equal spaced slots through the threads in an ordinary mild steel hex nut. It will be found that many of the guide bushings in the broach set are close enough in size to the root diameter of common nut sizes to permit them to be slipped inside the nuts to guide the broach, as depicted in the accompanying illustration.

After the broaching operation, the nuts are given a light case hardening and are ready for use. These dies are so economical that they may be discarded when dull. The number of slots to be broached will vary with the size of the nut. The writer has used as few as four slots and as many as eight per nut. Spacing of the slots by eye has been found to be sufficiently accurate for the purpose.

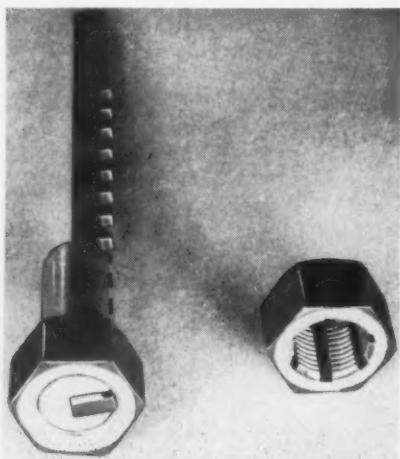


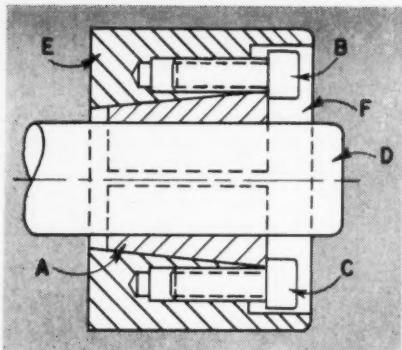
Illustration shows how ordinary mild steel hex nut can be quickly and economically made into a rethreading die by broaching.

★ modern machine shop ★

Non-Marring Shaft Collar

By F. MURRAY

The accompanying sketch shows a cross-section through a shaft collar which is designed to prevent marring of the shaft when the collar is clamped in place. The design includes a tapered bushing,



Cross-section of non-marring shaft collar.

A, which is split through one wall and is forced into its hole by two screws, B and C, whose heads contact the end of the bushing, thus causing it to grip the shaft, D, and solidly position the collar, E, on the shaft.

The sketch shows a counterbored recess, F, in the outer end of the collar; however, in place of this recess, counterbored holes could be used for the screw heads.

★ modern machine shop ★

Simple Air Check Valve

By ROGER ISETTS

Machine operators around the plant frequently use air hoses to blow away chips and other foreign material. This can be quite dangerous because full line pressure is usually used. Flying chips can cause serious injury to the operator or passersby.

A simple inexpensive check valve that will greatly reduce this safety hazard can be made as shown in the accompanying sketch. A round cold-

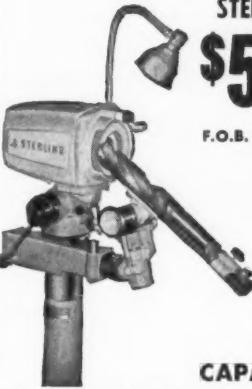
True Conical Grinding on a STERLING Drill Grinder gives you Faster Cutting Drills and More Holes per grind

Conical grinding of a drill point produces the same clearance angle from O.D. to web. The drill enters the work easier, cuts a uniform chip that requires less pressure, less power.

STERLING "DV"

\$590.00

F.O.B. Eau Claire, Wis.



CAPACITY

90°—140° Included angle, variable clearance angle set with built-in gage. Grinds $\frac{1}{8}$ " to $2\frac{1}{2}$ " drills; 2, 3 & 4 flutes.

Set-up is simple and fast because no chucks or collets are used. Built-in diamond wheel dresser produces a finished cutting edge that stands up longer. You get more, accurate holes with drills ground on a STERLING "DV".

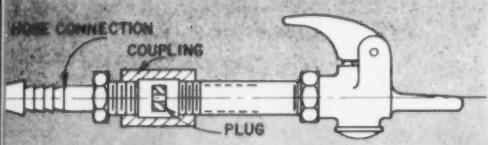
Ask your STERLING Dealer for complete information on all STERLING Drill Grinders and STERLING Tool and Cutter Grinders or write direct

**McDONOUGH
MANUFACTURING CO.**

1521 GALLOWAY • EAU CLAIRE, WISC.

For more data circle 418 on Postpaid Card

ideas from readers . . .



Sketch showing simple check valve for air hose.

rolled steel plug with a small hole drilled in the center is inserted inside the coupling. The diameter of the hole in the plug should be approximately $1/16$ to $1/8$ inch, depending on the desired pressure reduction.

Since a copious air blast is usually not necessary, such a throttling plug should in no way inconvenience the machine operator or reduce his normal efficiency.

★ modern machine shop ★

Machine Tool Film

The completion of an educational movie designed for showing to the general public has been announced by the National Machine Tool Builders' Association. Entitled "One Hoe for Kalabo," the 16 mm., 27½-minute sound and color film explains what machine tools are and what they do for mankind. It opens with a sequence shot in the tiny village of Kalabo in Barotseland, in the valley of the Zambezi River in Northern Rhodesia, showing natives digging bog iron ore, smelting it in a primitive furnace fed with goat skin bellows, and producing, as the result of a whole day's work, a little chunk of iron out of which is pound-

ed a single hoe. This primitive form of manufacture, unchanged for centuries, is then contrasted with today's modern production methods which supply us in quantity with the various modern comforts and conveniences.

Today's civilization, the movie explains, is made possible only because we have power-driven tools—machine tools—that can cut and shape metal into the working parts of autos, typewriters, television sets, generators, food processing machinery, steel-making machinery—in fact every type of mechanism, for the home or the factory. The film shows close-ups of a variety of machining operations so that the work done by machine tools can be seen and understood. It tells the relationship between machine tools and employment; between machine tools and our standard of living; between machine tools and national defense. It demonstrates the interchangeability of parts, without which mass production would be impossible. It tells how machines now do the jobs that muscles used to do.

Copy of the film is available by writing to Modern Machine Shop, 431 Main St., Cincinnati 2, Ohio.

More Information?

For additional information
on any product mentioned
in this issue, please use the
READER SERVICE CARDS
opposite pages 32 and 284.

TRADE MARK
"Jørgensen"
REG. U.S. PAT. OFF.
and
"Pony"

CLAMPS



the clamp folks

ADJUSTABLE CLAMP CO.
436 N. Ashland, Chicago 22, Ill.

ASK YOUR
SUPPLIER.
Send for free
32-page
catalog.

For more data circle 419 on Postpaid Card

Industrial concern engaged in mechanical and machine tool construction—very good modern equipment—150 workers—desires exclusive license for manufacture and sale of small or medium-sized machine tools or machines for plastics (compression presses). Submit offer to A.C.M., 35 rue du R.P.C. Gilbert, in Asnières (Seine), France.

For more data circle 420 on Postpaid Card

SUPER COMPARATOR

Gaging Head by Mahr

Reading in 20 MILLIONTHS of an inch

ACCURACY over entire range ± 10 MILLIONTHS
RANGE of dial $\pm .001$ "
SPACE between graduation lines .0354"

... with these SPECIAL ADVANTAGES

- CONSTANT MEASURING PRESSURE and practically frictionless movements of all parts
- EXTREME MEASURING ACCURACY and MAXIMUM SENSITIVITY
- SHOCKPROOF MOVEMENT fully JEWELLED
- FINE ADJUSTMENT over entire dial range
- CABLE RELEASE for lifting of feeler point
- SAPPHIRE TIPPED contact point

Stands and
Brackets
available



GUARANTEED Mahr QUALITY

OTHER COMPARATORS

with
.000050" and .0005"
Graduations

IF NOT AVAILABLE AT YOUR FAVORITE SUPPLY HOUSE,
WRITE TO US FOR ILLUSTRATED FOLDER

MAHR GAGE CO., INC.

274-MO LAFAYETTE ST. • NEW YORK 12, N.Y.

For more data circle 422 on Postpaid Card

LOWEST PRICES

Diamond Wheel Dressers

Guaranteed to be full, individual stones, mounted in 7/16 x 6" cold rolled shanks

Carat Price

1/4	\$ 2.25
1/2	4.00
3/4	6.00
1	8.25
1 1/2	12.00
2	16.00



* These diamonds can be set in any shank to your specification for \$1.00 each extra.

* Prompt resetting service

Allstate Diamond Products, Inc.

Manufacturers of a complete line of
diamond tools and wheels
245 W. 27th St., Dept. F, New York 1, N.Y.
Chickering 4-7725

* Dealers' inquiries invited

For more data circle 421 on Postpaid Card



HEADQUARTERS FOR
PRECISION MEASURING
INSTRUMENTS
AND FINE TOOLS

news of the industry

**New plants and expansions . . .
officers . . . appointments . . . obituaries.**

Edited by L. L. BALDHOFF

NEW OFFICERS ELECTED AT TRIPLE INDUSTRIAL SUPPLY CONVENTION

At the Triple Industrial Supply Convention, held at the Statler Hilton Hotel, Dallas, Texas, the American Supply and Machinery Manufacturers' Association, Inc., the National Industrial Distributors' Association and the Southern Industrial Distributors' Association elected new officers.

For the A.S.M.M.A., the following officers were elected to serve for the fiscal year of June 1, 1959 to May 31, 1960: president — Fred C. Emerson, Spartan Saw Works, Inc., Springfield, Massachusetts; first vice president—Samuel D. Conant, The Jacobs Manufacturing Company, West Hartford, Connecticut; second vice president—Paul A. Johnson, Dake Corporation, Grand Haven, Michigan; secretary—

Clare Payne, Safety Socket Screw Company, Chicago, Illinois; and treasurer—George H. Woodland, Chain Belt Company, Milwaukee, Wisconsin.

For the N.I.D.A., the following officers were elected for the coming year: president — Wallace H. Campbell, Campbell Industrial Supply Company, Seattle, Washington; first vice president—Miles I. Stray, Charles A. Templeton, Inc., Waterbury, Connecticut; second vice president—John D. Williams, The Mau-Sherwood Supply Company, Cleveland, Ohio.

For the S.I.D.A., the following officers were elected: president—L. D. Montague, B. L. Montague Company, Inc., Sumter, South Carolina; first vice president—W. P. Marshall, Jr., Marshall Supply and Equipment Company, Tulsa, Oklahoma; and second vice president—John C. Pye, Pye-Barker Supply Company, Atlanta, Ga.



Wallace H. Campbell



L. D. Montague



Fred C. Emerson

R. B. TOOL COMPANY MOVES TO LARGER QUARTERS

R. B. Tool Company recently announced that it has moved its entire operation from Palisades Park, New Jersey, to 340 Maple Avenue, Westbury, Long Island, New York.

The company states that its new and enlarged quarters will provide for better customer service.

★ modern machine shop ★

UNION TWIST DRILL APPOINTS NEW DISTRIBUTOR

The Union Twist Drill Company, Athol, Massachusetts, and the S. W. Card Division, Mansfield, Massachusetts, have announced the appointment of Machinists' Tool and Supply Company, Los Angeles, California, as their authorized distributor.

Machinists' Tool and Supply Company will handle the complete line of Union Drills and Cutters, together with the S. W. Card Division line of taps, dies and gages.

★ modern machine shop ★

KLAAS WILL MOVE TO NEW QUARTERS IN CLEVELAND

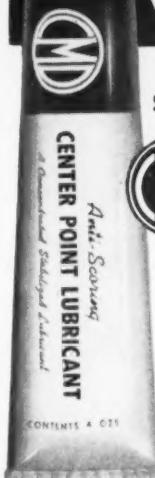
The Klaas Machine and Manufacturing Company, Cleveland, Ohio, plans to begin its second quarter century in a new building, to be completed in the fall of 1959. All facilities of the present location at 4314 East 49th Street, will be in the new 20,000 square foot plant.

The new building has been designed specifically to carry on the same services of contract manufacturing, custom welding, machine shop work, special machinery, conveying equipment and the EMCO Power Press.

The Klaas plant will be conveniently located on Schaaf Road near the Cloverleaf intersection of Ohio Routes 17 and 21, south of Cleveland.

July, 1959

HOW TO INSURE TOP METALWORKING PERFORMANCE for only



Send for a
trial order of
**ANTI-SCORING
LUBRICANTS**

For top performance on lathe centers, grinding, press fit, stamping, die posts and many other operations—CMD ANTI-SCORING Lubricant can't be beat. It makes your operations smoother, faster, easier, and of course more profitable. Prevents scoring, seizing, galling... all bugaboos in modern machining work. This trial order will start you on your way to top performance where a high pressure lubricant is needed. You will be surprised to find how long it lasts. Get yours today in both oil and grease consistencies.

TRIAL ORDER— TWO FOUR OZ. TUBES \$1.00

Send me my order of CMD right away!
Bill me Bill my company

Name _____

Company Name _____

Address _____

City _____ State _____

Chicago Manufacturing and Distributing Co.
1910 West 46th St., Chicago 9, Illinois

CHICAGO MANUFACTURING
AND DISTRIBUTING CO.

For more data circle 423 on Postpaid Card

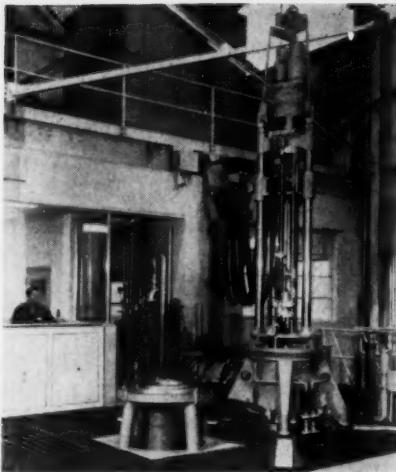
modern machine shop 159

news of the industry . . .

VACUUM ARC MELTING FURNACE IN FULL PRODUCTION AT LATROBE STEEL

"Consumable electrode vacuum arc melting that produces highly refined tool steels and superalloys for today's critical jet-age engineering applications is now on a production basis at Latrobe Steel Company, Latrobe, Pennsylvania. This point was reached with the recent installation of our new furnace." This was the statement of J. E. Workman, executive vice president, at a press conference held recently at the company's plant. Later, the group inspected the new consumable electrode vacuum arc melting furnace and was given a run down on its operation.

The new furnace and its components are American-made, having been designed, built, installed and placed in



Complete installation of melting furnace

operation by Lectromelt Division, McGraw-Edison Company, in cooperation with the technical and engineering

Combines
2 operations
in one . . .
to give
you the snug-
gest fitting, an-
gular tubing joints
for cheaper,
quicker, easier in-
duction welding
or brazing.

Cuts the **FASTEST** and **FINEST**
NOTCHES Ever Made!

ARC-SNUG

ARC-SNUG gives you clean-edge, close-fitting, true contour notching by making both the first and second cuts of the notch in a single downstroke of the press. Notches $\frac{1}{2}$ " to $\frac{1}{4}$ " O.D. metal tubing (16 gauge and under) at angles ranging from 35 to 90 degrees. Special sizes and special dies to cut stainless steel, Monel metal, etc., made to order. Dies for various angles and sizes are interchangeable. Write **FURNISHED** for literature.

**NOTCHED
SAMPLES
GLADLY
FURNISHED**

VOGEL TOOL & DIE CORPORATION
1823 NORTH 32ND AVENUE • STONE PARK, ILLINOIS

For more data circle 424 on Postpaid Card

personnel of Latrobe Steel Company. The unit, first of several to be installed, has been yielding a variety of grade melts since early March.

R. T. Eakin, vice president in charge of operations, commented, "The relatively short period of time required to put our furnace into successful production bespeaks the operating simplicity and excellence of the furnace design and the abilities of our trained technicians required to operate it. The experience our personnel gained with Latrobe's pilot furnace has paid off in that the highly successful first melt was made within a few hours of the final installation inspection."

The Latrobe Furnace is referred to as a 20 inch diameter unit, capable of producing a maximum ingot of 8,500 pounds, or an annual output of some 6,000,000 pounds. It incorporates the most advanced design features engineered to date. A compact power supply, first of its kind in the world, and a unique electrode drive control assures automatic split-second correction of any variables during the melting cycle. This sensitive control system guarantees

uniformity of metallurgical properties throughout the ingot. Its operational floor space requirement is unusually small—just 375 square feet, with operations conducted from an adjacent control point.

At present, the new facility will produce tool steels for engineering applications, bearing steels, aircraft-missile steels and alloys, where both the high temperature and the high strength properties are most essential.

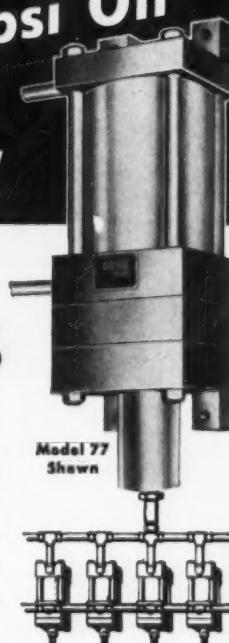
Up To
10,000 psi Oil
from
Shop Air!

Miller AIR TO HYDRAULIC
BOOSTERS

No Pumps or High Pressure Valving Needed

Hook a Miller Air-Hydraulic Booster to your air line and get INTENSIFIED (ratios up to 100 to 1) Hydraulic Power that you can vary and control at will and use for such common shop operations as punching, clamping, pressing, riveting, shearing, welding, crimping, testing, etc. High pressure booster output drives the hydraulic work cylinders and can be directly applied (without cylinders) in testing, measuring, other applications. Boosters save air, space, weight, require little or no maintenance, and hold pressure as long as desired without additional power consumption. Models for immediate delivery.

Model 77 Shown



Write For Full Details

Miller FLUID POWER DIVISION
Kiek Reedy Corp.
7NO23 York Rd., Bensenville, Ill.

For more data circle 425 on Postpaid Card

news of the industry . . .

WARNER AND SWASEY TO BUILD RESEARCH CENTER

Plans for construction of a modern Research Center on a 12 acre, landscaped site in Solon, Ohio, have been made by The Warner and Swasey Company, Cleveland, Ohio, manufacturer of a diversified line of machine tools, earthmoving machinery, textile

equipment and specialized industrial measuring and control devices.

Located on the north side of Aurora Road, east of the Metropolitan Park, the new research facilities will comprise 40,000 square feet of floor space. This will include offices, research laboratories, a library, design and experimental areas, a fully equipped prototype shop and a high-bay general test section with overhead cranes and other heavy handling equipment. The Research Center site fronts 750 feet on Aurora Road.

Purpose of the new facility is to centralize all of the company's research and development activities and personnel, insofar as practical, for greater efficiency and economy.

New Company Is Formed In Halifax

The Warner and Swasey Company, and Asquith Machine Tool Corporation, Limited, Halifax, England, are jointly forming a new company, to be located in Halifax, for the manufacture of the Warner and Swasey line of single spindle automatics for United Kingdom, European and other world markets. Articles of Association for the new company,



Die Springs

Chrome vanadium die springs in stock in a wide variety of hole and rod sizes, lengths and deflections. Medium, medium-heavy, heavy duty for increased life and reduced down time. Write for list of specifications and prices, and name of nearest distributor.



Raymond Manufacturing Division

**Associated Spring
Corporation
Corry, Pennsylvania**

8837

For more data circle 426 on Postpaid Card

NOTHING

heats like...
is more modern than...
is more economical than...



HIGH SPEED FULL
MUFFLE FURNACES
Bench type for heat
treating high speed
and alloy steels.
Temperatures to
2400° F.



LARGE FLOOR
TYPE OVEN
FURNACES
For universal heat
treating of larger
pieces. Temperatures
to 2000° F.

Write for
complete
"BUZZER"
CATALOG



Est. 1911

CHARLES A. HONES, INC.

141 So. Grand Avenue, Baldwin, L.I., New York • BALdwin 3-1110

"BUZZER" Burners & Furnaces for Heat Treating, Melting, Soldering

For more data circle 427 on Postpaid Card

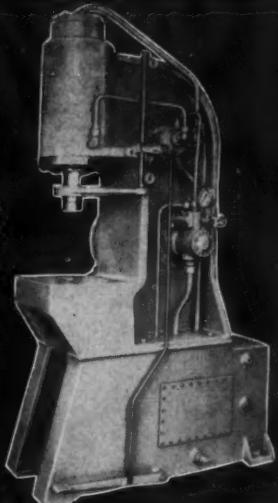
POWER

. . . when you need power!

1½-75 TONS

GREENERD, for 76 years, has manufactured Power-Performing ARBOR and HYDRAULIC PRESSES; maintenance-free; may be furnished to J.I.C. Standards, and designed to handle the following variety of work:

• ASSEMBLING	• FORMING
• BENDING	• MOLDING
• BROACHING	• RIVETING
• BURNISHING	• SIZING
• CRIMPING	• STAKING
• EMBOSsing	• STRAIGHTENING



Write for Catalogue #656

Greenerd ARBOR PRESS CO.

41 CROWN ST. NASHUA, N.H.

For more data circle 428 on Postpaid Card

news of the industry . . .

to be called Warner Swasey Asquith, Limited, have been filed in London.

It was stated this move will enable Warner and Swasey to tap foreign markets, from which it has been practically excluded because of the advantages enjoyed by foreign competition. Warner and Swasey automatics, the first model of which was introduced

about ten years ago, have had a steadily growing acceptance in the United States, until today they represent a very substantial share of domestic machine tool business. By building these machines also in England, within the Sterling area, production costs will be comparable to those of foreign builders.

Warner and Swasey will license the new company to manufacture the machines to its designs and under its patents. The machines will be built by Asquith, at the outset in its present Halifax plant, and later in separate facilities to be provided by Asquith.

★ mms ★
**HEALD ELECTS
OFFICERS**

Three executives of The Heald Machine Company, Worcester, Massachusetts, have been elected to the board of directors. They are: A. Francis Townsend, vice president - engineering and development; Edwin J. Keyes, vice president and works manager; and Raymond A. St. John, vice president and general sales manager.

Five directors were re-elected at the company's annual meeting of shareholders:



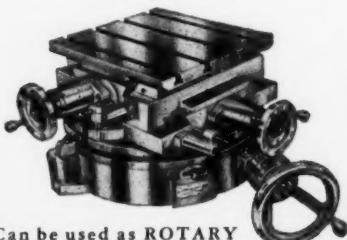
Guaranteed
FOR 18 MONTHS
AND THAT'S NOT ALL

The unique new Clearing Torc-Pac is not just the finest design in the press field—it's the finest in quality and performance. That's why Clearing can guarantee these 22, 32 and 45 ton presses for 18 months. You get more for the money when you buy a Torc-Pac and more in performance too. Write for details.

usi[®]
Clearing
DIV. OF U.S. INDUSTRIES, INC.
6499 W. 65TH ST., CHICAGO 38, ILL.

For more data circle 429 on Postpaid Card

**STEVENS—THREE-IN-ONE
ROTARY COMPOUND TABLES
IN 3 SIZES**



Can be used as ROTARY COMPOUND TABLE or separated to use *individually* as Compound table alone and Rotary table alone—all on one investment

The Stevens-Three-in-One will save set-up time and reduce inaccuracies caused by multiple set-ups.

See your dealer or write for bulletins

The John B. Stevens Company
Main Street, Somerville, Conn., U. S. A.

For more data circle 430 on Postpaid Card

People work better when they SEE BETTER®



In the General Electric Plant
Magni-Focuser helps a worker make adjustments on precision equipment.

MAGNI-FOCUSER'S

matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

ACCURACY is an ECONOMY!
and only precision offers you HIGHEST QUALITY!

now is the time
to put your
**OLD STEEL
PARALLELS** to "LIKE NEW"



conditions and to be ready for the big push.

For the first time Anton Machine Works offers to regrind your old parallels to the following tolerances:

- Parallelism and straightness over length of 6" $\pm .0001$
- Size tolerance between a pair $\pm .00005$. A complete list of new parallels in stock will be mailed on request.

ANTON MACHINE WORKS

1226 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 431 on Postpaid Card

MAGNI-FOCUSER

SPEEDS PRODUCTION
With Third Dimensional (3-D) Vision Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents. Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

Send for descriptive folder

Edroy Products Co.

Dept. P, 480 Lexington Ave.
New York 17, N. Y.

For more data circle 432 on Postpaid Card

news of the industry . . .

Richard A. Heald, Carl F. Roby, Lawrence H. Cousineau, Carl M. Beach and Frederick V. Geier, Jr. Mr. Heald was re-elected chairman.

★ modern machine shop ★

PAUL A. MONTANUS

Paul A. Montanus, 76, president of The Springfield Machine Tool Company since 1947, died recently at Springfield, Ohio.

He joined the company in 1906 as vice president and general manager and, for many years, was active in civic affairs. Mr. Montanus attended Massachusetts Institute of Technology. The company, under his leadership, continued to be a prominent builder of engine and toolroom lathes and, in the 1940's, introduced a line of vertical universal grinders. The firm was started in 1887 by Philip E. Montanus.

AIRETOOL Pneumatic Tools do more work per dollar

Airetool pneumatic tools operate at the same air pressure as others. Your power costs are the same. Yet Airetool equipment consistently achieves higher production than other tools per man hour. There is a good reason. Airetool air motors get more work from a pound of air. Your operators get more work from their Airetool pneumatic tools. Why not write today for complete information about these and other Airetool high-production tools? Ask for Catalog #63.



For more data circle 433 on Postpaid Card

166 modern machine shop

JOHN CROMWELL LINCOLN ALTON FRANK DAVIS

John Cromwell Lincoln, founder of the Lincoln Electric Company, Cleveland, Ohio, passed away recently at the age of 92. Mr. Lincoln was president of the corporation from 1906 to 1928, when he became chairman of the board and was succeeded as president by his brother.

Alton Frank Davis, vice president and secretary of Lincoln, died at the age of 69. He began his long career at Lincoln as a service and salesman.

★ modern machine shop ★

BYRON FRANK BOWER

Byron Frank Bower, born on a farm near Warsaw, Ohio, passed away recently at the age of 63.

In 1941, Mr. Bower founded the Pines Engineering Company, Inc.,



VERTICAL GRINDERS

Step up production on rough grinding, snagging, depressed center wheel work.



MIDGET DIE GRINDERS

Save time on precision, intricate grinding jobs. Use with carbide burrs and abrasive wheels. 38,000 to 60,000 rpm.



HORIZONTAL GRINDERS

Fast for fine finishing, grinding, snagging. 4" to 8" wheels.



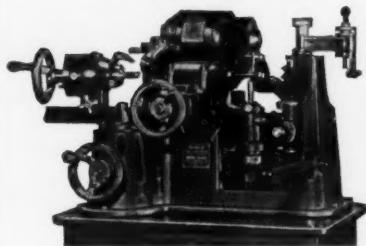
PNEUMATIC DRILLS

Handle drilling operations in a hurry. 5/32, 3/16, 1/4, 1/2, 5/8, 3/4" capacities.

July, 1959

HYBCO TAP GRINDER

Sharpens Chamfers, Flutes
and Spiral Points

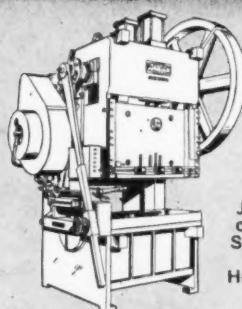


MODEL 1100

- Capacities No. 0 Machine Screw to 1½" Hand Taps.

HENRY P. BOGGIS & CO.
708 E. 163rd St., Cleveland 10, Ohio

For more data circle 434 on Postpaid Card



Write
today for
BULLETIN
1958

Complete
"specs" on
Inclinaline,
Straight Side.
Gap and
Horn Presses.

GAP

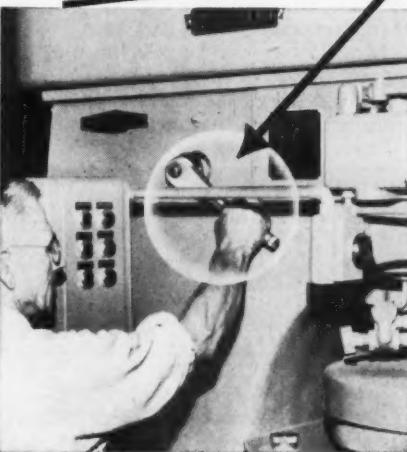
Johnson
POWER PRESSES

JOHNSON MACHINE & PRESS CORP.
620 W. INDIANA AVE., ELKHART, INDIANA

For more data circle 435 on Postpaid Card

July, 1959

Fast and Safe
in hard-to-reach spots



This **LOWELL** Reversible Ratchet Wrench

- speeds setup time
- keeps hands from moving parts

An exclusive and popular feature of the Series 20 Lowell Gear Wrench is the reversing knob at the end of the handle.

Machine tool builders find it especially useful for working in dangerous or inconvenient parts of the machine where the hands can't safely reach. And its great strength—the crushing action is on the pawls, not on a pin or screw—makes it a dependable wrench on any job.

In the photo above, a Series 20 wrench is shown as original equipment on the Norton Hyprolap lapping machine. Besides its important functional use, this Lowell Wrench is favored for its neat and modern appearance.

Gear sizes range from $\frac{1}{4}$ " to $2\frac{3}{8}$ ", square or hex, and handles from 7" to 36" in length.

Write for Illustrated Details

LOWELL WRENCH CO.

Dept. M-75

Worcester 8, Mass.

For more data circle 436 on Postpaid Card

news of the industry . . .

located in Aurora, Illinois, and served as president until his death. Under his able leadership, this small company has grown to be recognized throughout the world as one of the leading manufacturers of tube benders.

Mr. Bower was known throughout industry in this country, as well as abroad, having made several business trips in various parts of the world.

WALES-STIPPIT EXPANDS ACTIVITIES IN WORLD MARKETS

Wales-Strippit, Inc., a unit of Houdaille Industries, Inc., Akron, New York, has announced the further expansion of the company's activities in world metalworking markets.

A licensing arrangement to sell all Wales-Strippit hole punching and notching equipment and metalworking machinery in the British Isles has been entered into with E. H. Jones, Limited, Sussex, England.

Negotiations have also been completed with the Watanabe Trade and Engineering Company to sell in Japan.

Through the cooperation of the U. S. Department of Commerce Trade Mission to India, negotiations are underway with Ram Krishan Kulwant Rai, Calcutta, for the sale of tooling and metalworking machinery in India.

These moves were attributed to Houdaille's interest in all the world's markets and their increasing value to U. S. industry. In addition to these licensing negotiations, Houdaille has similar plans for other countries, including those in South America.

EVERY TIME YOU MOVE A MACHINE

**Barry
Machine Mounts
CUT
MAN-HOURS
90%**

In new installations —
In relocating machinery —

you get savings like these!

3 man-hours instead of 42 man-hours to move machines at Johnson & Johnson

60% saving in new machine installation cost at American Type Founders

No lost production time in moving a complete machine shop at Wyman-Gordon

Barry Leveling Machinery Mounts let you move machines wherever they are needed, and have them in full production in minutes — with no delays for drilling, lagging, or shimming.

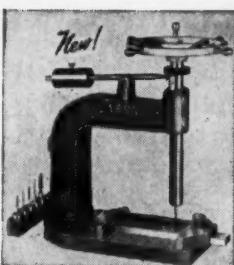
Write now for the Field Reports that prove these savings — that you can get with Barry Machinery Mounts.



**BARRY
CONTROLS**
INCORPORATED

783 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS
For more data circle 437 on Postpaid Card

BARRY B MOUNT
SOLD THROUGH INDUSTRIAL DISTRIBUTORS



LASSY

**Supersensitive
Hand Tapper**

New exclusive features and top quality make Lassy Tappers outstandingly the finest available.

Write for New illustrated catalog on Time Saving Devices.

LASSY TOOL COMPANY, Plainville, Conn.

For more data circle 438 on Postpaid Card

CAMS

MADE TO YOUR SPECIFICATIONS

— Except Screw Machine Cams —

Design Assistance Offered

KIDDE PRECISION TOOL CORP.
15 LOCUST AVENUE ROSELAND, N. J.

For more data circle 439 on Postpaid Card



AS WELL AS

PRECISION
MILLED-FROM-THE-BAR
CAP SCREWS • SET SCREWS
COUPLING BOLTS and STUDS

ARE PRODUCED BY

Wm H. Otemiller Co.
YORK, PENNA.

Precision Milled Specials? Of Course!
We'll be glad to
quote on yours — promptly.

For more data circle 440 on Postpaid Card

July, 1959

LASSY

**Supersensitive
Hand Tapper**

New exclusive features and top quality make Lassy Tappers outstandingly the finest available.

Write for New illustrated catalog on Time Saving Devices.

LASSY TOOL COMPANY, Plainville, Conn.

For more data circle 438 on Postpaid Card

**This Versatile Tool
Gives You a Modern
Machine Shop . . .
Blends Machine and
Grinds Lines . . . Cleans
and Deburr Fast . . .
Reduces Micro-Inch Finish**

**Low-
Cost**



liquid Honing*

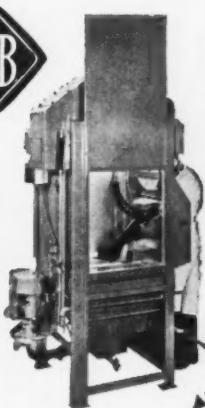


blends out grind lines
and produces a smooth
non-directional surface
for good oil flow . . .



clears away mill scale,
rust, welding and heat
discolorations.

Dollar for dollar, job for
job, no other surface-con-
ditioning method can
equal Liquid Honing.



Liquid Honing "smog"— fine abrasive material in suspension — does surface conditioning, cleaning, descaling and deburring. Production speed is incomparable, so you can expect savings up to 80% in some cases. Liquid Honing maintains close tolerances and improves surfaces. Write for details or send a sample part for free demonstration processing.

*Liquid Honing and Vapor Blast are trademarks.

**VAPOR BLAST
MFG. CO.**
3031 A W. Atkinson Ave.
Milwaukee 16, Wis.

For more data circle 441 on Postpaid Card

modern machine shop 169



news of the industry . . .

"ENGINEERED" PRODUCTION MARKING EQUIPMENT



No. 2A
NAME
PLATE
STAMPING
MACHINE
•
Automatic
•

Performs all operations including serial numbering. Slide feed provides absolute safety. Write for Catalog No. 1 & 2A.

PRECISION MACHINES and ALL EQUIPMENT including DIES, FIXTURES, CONTROLS, etc.

ACROMARK MARKING MACHINES are of more than 300 different kinds — each one developed for its specific field. STOCK models are the ones most widely used and adapted — but you'll get the correct machine for the job if you buy ACROMARK.

Write today for 1959 General Catalog, fully indexed, covering over 500 marking machines and tools, all originated and patented, copyrighted or registered at U. S. Pat. Off. by ACROMARK. Send sketch or details of your marking need for Engineer's recommendation —without obligation.

REG. U. S.
PAT. OFF.

The
ACRO
MARK
Company

9 Morrell St., Elizabeth 4, N. J.

"The Original Marking Specialists"

For more data circle 442 on Postpaid Card

170 modern machine shop

HAMILTON TOOL APPOINTS DISTRIBUTOR

The Hamilton Tool Company, Hamilton, Ohio, manufacturers of precision drilling machines, precision tapping machines, precision gear hobbing machines, portable elevating tables and special positioning equipment for industry, has announced the appointment of the Tornquist Machinery Company, 864 Burlway Road, Burlingame, California, as exclusive distributors for the Northern California territory.

★ modern machine shop ★

B. C. AMES RELOCATES DETROIT OFFICE

The B. C. Ames Company, Waltham, Massachusetts, manufacturer of dial indicators, micrometer dial gages, air gages and portable electronic gages, has announced the following changes in its Detroit area operations. The Detroit office will be located at 668 Pallister, Detroit 2, Michigan. Cecil C. Sprung is the new manager of this branch.

Former Detroit manager, Edward W. Goodwin, has become a manufacturers' representative, as E. W. Goodwin, Sales and Service, located at 5265E Mt. Morris Road, Mt. Morris, Michigan.

★ modern machine shop ★

TORIT TO OCCUPY NEW PLANT IN EARLY FALL

A new plant, designed to consolidate operations now carried on at three separate locations for Torit Manufacturing Company, St. Paul, Minnesota, is nearing completion.

The new building will increase the company's manufacturing and engineering facilities by about 25 percent.

July, 1959



"I'd be lost
without my
96-page
Scherr-Tumico
Catalog!"

Get YOUR copy at any one
of our 1586 dealers or . . .

. . . write for YOUR
copy to any of our
3 "Coast to Coast"
locations:



★ Eastern Office: **GEORGE SCHERR CO., INC.** • 200-MM Lafayette Street • New York 12, N. Y.

★ Midwest Office and Factory: **TUBULAR MICROMETER CO.** • St. James, Minnesota

★ West Coast Office: **SCHERR-TUMICO CO.** • 3337-39 West Olympic Blvd. • Los Angeles 19, Cal.

For more data circle 443 on Postpaid Card

NEW DRILLS FROM OLD WITH NU-TANGS



**NU-TANGS
CUT DRILL
REPLACEMENT
COSTS!**

We return
them like
this!

Send them
to us like
this!

Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG® process replaces twisted or broken tangs with brand new tangs of correct size—and with GUARANTEED ORIGINAL STRENGTH. No welding—No distortion—No shortening of drills—No sleeves.

Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed! Send for complete information.

* Patent No. 2,512,033

*write
today*

NU-TANGS INC. 1335 Bates Street
Cincinnati 25, Ohio

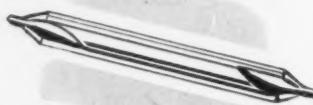
For more data circle 444 on Postpaid Card

news of the industry . . .

Construction is ahead of schedule and the company hopes to move into the new premises this summer.

The new property provides sufficient space on trackage for a future expansion that would double the new plant's 45,000 square feet. Founded in 1915 as

MICRO CENTER DRILLS



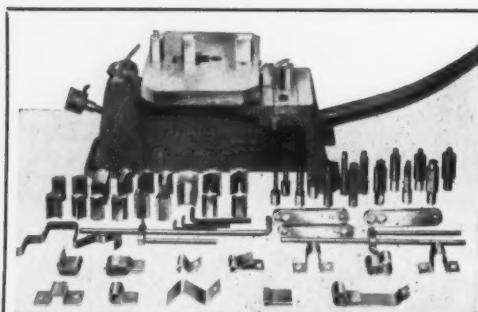
and COUNTERSINKS

Diameter		Length		Price Each		
No.	Drill	Drill	Overall	Right Hand	Left Hand	
00	0.020"	"	1½"	\$1.45	\$1.70	
01	0.035"	"	1½"	1.20	1.30	
0	1/32"	"	1½"	1.10	1.35	
1	3/64"	"	1½"	.95	1.20	
2	1/16"	"	1½"	1.00	1.20	
3	3/32"	"	2"	1.00	1.30	

60 degree—S.H.S
Ground from the Solid and Hardened Rod
A Tool of exceptional Quality
A Tool for the Hard to do Job
Available immediately from stock

H. KAPP ENGINEERS
105-25 67th Rd. • Forest Hills, L. I., N. Y.

For more data circle 445 on Postpaid Card



For more data circle 446 on Postpaid Card

172 modern machine shop

a welding shop, Torit has grown to be a major manufacturer of industrial dust collectors and a leader in the production of equipment for dentists and dental laboratories.

★ modern machine shop ★

DIXIE EXPANDS TO MEET DEMANDS OF INCREASED VOLUME

Dixie Tool Industries, Bridgeport, Michigan, has announced an addition to its plant consisting of approximately 300 square feet in factory space, 400 square feet of warehouse space and 1,000 square feet of office space.

The additional factory area will be used to provide space for new fluting equipment, while the warehouse space will house stock items.

This new enlarged office space will facilitate handling of customer inquiries and correspondence and orders by the increased office staff. Consistent growth during the past few years has necessitated these additions to Dixie Tool Industries to provide better service for its many customers.

★ modern machine shop ★

BIXBY ELECTED PRESIDENT OF BRYANT CHUCKING GRINDER

H. Glenn Bixby has been elected president of Bryant Chucking Grinder Company, Springfield, Vermont, at a



BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

AIR OR HAND MODELS FOR UP TO

1/4" to 4" MATERIAL
Write for brochure which illustrates
and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6-M Kalamazoo, Mich.



WRITE FOR FREE CATALOG

- Ground Cut Rotary Files for Soft Metals.
- Hand Chisel Cut for Hard Metals.
- Carbide Rotary Files.
- Salvage and Regrinding Service.
- Dealers Inquiries Invited.

Rota

FILE CORP.

1328 — 58TH ST.
BROOKLYN 19, N.Y.

For more data circle 447 on Postpaid Card

- PIERCING PUNCHES
- BUTTON DIES
- STANDARDS • SPECIALS

Also send Blue Prints for Estimates on
screw machine products and
centerless grinding.

PEMCO PERFORATORS CO.

DIVISION

PORTER MACHINE CO.
CINCINNATI 9 OHIO
30 YRS. SERVING INDUSTRY

For more data circle 448 on Postpaid Card

SAVAGE
NIBBLING MACHINES

Patented
Tool Holder
Assembly →

NIBBLE your COSTS

- No sparks
- No open flame
- No oxidation
- No secondary operations

No. 236

Totally enclosed head . . . for safety.

Direct-over-center positive drive . . . gives
more power.

One-piece 360° revolving head . . . for
fewer parts and longer life.

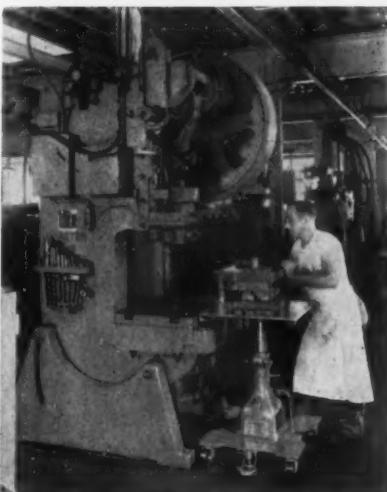
Write for folder

W. J. SAVAGE CO.
KNOXVILLE TENNESSEE

For more data circle 449 on Postpaid Card

July, 1959

THE BEST
PORTABLE
ELEVATING TABLE
YOU CAN BUY...
(Eliminates Cranking)



2000 LBS. OR *1000 LBS. CAPACITIES
*ILLUSTRATED

**A precision made
MIDWEST TABLE
Costs no more!**

- ✓ It's hydraulic . . . positions work or feeds at desired height without use of hands
- ✓ Rigid cast construction
- ✓ Top turns 360° and clamps
- ✓ Foot release valve to lower
- ✓ Machined top surface can be used as work table.
- ✓ Roller bearing casters with ball bearing swivels
- ✓ Floor clamping available extra

Write today . . . specials on request

MIDWEST
ENGINEERING COMPANY

114 WEBSTER ST. • DAYTON 2, OHIO

For more data circle 450 on Postpaid Card

modern machine shop 173

news of the industry . . .

meeting of the board of directors. The election of Mr. Bixby followed the resignation of former president, J. H. Beardsley.

The Bryant Chucking Grinder firm is a wholly-owned subsidiary of the Ex-Cell-O Corporation, located in Detroit, Michigan, of which Mr. Bixby is also president. Mr. Bixby announced that N. A. Leyds has been elected

to the office of vice president and general manager. Mr. Leyds, who will be in active charge of the company's operations, has been associated with the Bryant firm for six years and has widespread experience in the machine tool field.

The Bryant Chucking Grinder Company manufactures a complete line of precision internal grinding machines, high frequency grinding spindles and, also, magnetic drums that have been designed for electronic computers.

48-Hour Delivery* of Tooling for Special Internal Forming

**for Brown & Sharpe and other makes of
Automatic Screw Machines**

**Send for
this
FREE
SAMPLER
KIT**



See how these radial relief tools are ground, why they are so free cutting, how they produce quality parts (non-ferrous or steel) at very low cost. Prove in your own way, at your convenience, just what B & W has to offer.

Just mail this ad clipped to your letterhead, sign and we'll send the Sampler Kit to your personal attention. No obligation and return postage is enclosed in case. Tooling retained will be billed after case is returned.
*with overtime

B & W PRECISION PRODUCTS CO.

**11393 E. Eight Mile Road, P.O. Box 3865
Detroit 5, Michigan, Engineering Dep't. M**

For more data circle 451 on Postpaid Card

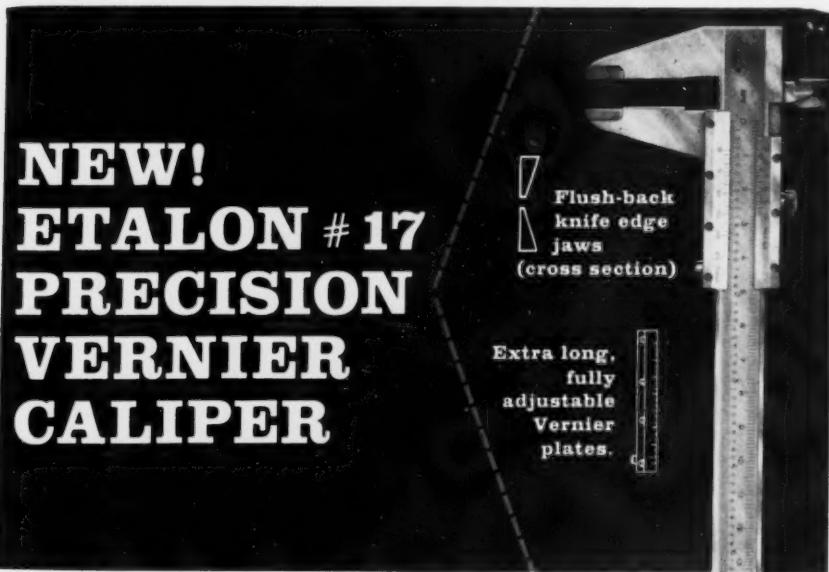
UNIVERSAL-CYCLOPS ACQUIRES BRIDGEVILLE PROPERTY

Universal-Cyclops Steel Corporation, Bridgeville, Pennsylvania, has purchased the land and buildings of the Flannery Manufacturing Company at Bridgeville.

Flannery Manufacturing Company, a division of Stubnitz Greene Corporation, Adrian, Michigan, terminated production at this location in June, 1958, and has moved its operations to other plants. The Flannery property,

located adjacent to the Bridgeville plant of Universal-Cyclops, comprises some ten acres of land with 186,000 square feet of building area. The sale involves none of the manufacturing facilities or equipment.

Universal-Cyclops said the additional facilities will be used for the warehousing of finished steel stocks and the consolidation of its offices. The company does not plan to use the property for steelmaking or other production purposes. No increase in the total employment is anticipated.



Dull chrome plated, will not chip or peel.
Exceptionally easy to read. Clear, wide Vernier slide.
Hardened Stainless Steel. Read inside, outside and
depth measurements from the same scale. English or
English and Metric combination in handsome contour case.



WRITE FOR CATALOG.

ALINA CORPORATION

122 East Second Street, Mineola, L. I., N. Y.

For more data circle 452 on Postpaid Card

free
literature**free literature**

**Use Postpaid Cards opposite page 32
and inside back cover for requesting
free copies of literature listed below.**

Steel Bars

La Salle Steel Co., 1474 - 150th St., Hammond, Ind. An 11 by 17 inch wall chart lists all AISI grades of cold finished steel bars. Five page comparison chart lists 241 various grades of steel bars.

For more data circle 5 on Postpaid Card

Marking Equipment

The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. Section G provides data on Acromark accessories and supplies for all hot stamping of plastics and other materials, including Acroleaf.

For more data circle 6 on Postpaid Card

Automatic Hydraulic Grinders

Olivetti Corporation of America, Machine Tool Division, 42-33 Northern Boulevard, Long Island City 1, N. Y. Catalog OMO 52 contains 20 pages of very helpful information on the company's line of automatic hydraulic grinding machines, including universal, production, plunge and inclined wheel types.

For more data circle 7 on Postpaid Card

Engraving Attachments

H. P. Preis Engraving Machine Co., 249 Industrial Branch, U. S. Highway 22, Hillside, N. J. 20 page catalog (List No. 103) illustrates and describes engraving attachments and accessories.

For more data circle 8 on Postpaid Card

Mechanical Cleaner

Logan Engineering Co., Aridifier Division, Department L-659, 4901 West Lawrence Ave., Chicago 30, Ill. Catalog No. 459 describes the simple, inexpensive way by which the Aridifier prevents the trouble that contamination, present in all air that comes from compressors, makes in delaying production, damaging equipment and destroying profits.

For more data circle 9 on Postpaid Card

Coolant Generator

Lloyd Tool Corp., 3330 East Colorado St., Pasadena, Calif. KoolMist Coolant Generator is described. Advantages of this system, prices and a free trial offered by the company are explained.

For more data circle 10 on Postpaid Card

New Metal Forming Process

Lodge and Shipley Co., Floturn Division, 3058 Colerain Ave., Cincinnati 25, Ohio. Flo-Reforming, a new process for producing tall, shell type cylindrical parts, is described in a four page bulletin. Included are cost comparisons with deep drawing, engineering data and equipment details.

For more data circle 11 on Postpaid Card

Tracer

Retro Developments, Inc., Galt, Ontario, Canada. Four page bulletin describes and illustrates the Mimik Tracer Valve that features universal stylus action, modular construction, completely sealed, all hydraulic, low stylus deflection and pressure and extreme accuracy.

For more data circle 12 on Postpaid Card

Machinery Replacement Practices

Heald Machine Co., Worcester 6, Mass. 14 page illustrated fold-out brochure provides complete details on how replacement of old machines paid off for six manufacturers.

For more data circle 13 on Postpaid Card

Grinding Fixture

Harig Manufacturing Corp., 5765 West Howard St., Chicago 31, Ill. Six page, color bulletin describes and illustrates the Harig Grind-All Fixture that has been designed to provide higher accuracy, greater range and maximum speed in grinding perforators.

For more data circle 14 on Postpaid Card

Speed Reducer and Control

Zero-Max Company, 1900 Lyndale Avenue, South, Minneapolis 5, Minnesota. Sixteen page color catalog completely describes and illustrates the Zero-Max, that is a mechanical fractional horsepower variable speed reducer and control.

For more data circle 15 on Postpaid Card

Boring Bars and Toolholders

R. B. Tool Co., Inc., 340 Maple Ave., Westbury, Long Island, N. Y. Sixteen page, color catalog describes and illustrates the company's complete line of precision tools, including boring bars and toolholders, carbide tools, recessing tools, threading tools, planer and shaper tools, live centers and driving centers.

For more data circle 16 on Postpaid Card

Benders

Wallace Supplies Manufacturing Co., 1804 West Cornelia Ave., Chicago 13, Ill. Thirty-six page, loose leaf type catalog provides valuable information on rotary benders, ram benders and roll benders.

For more data circle 17 on Postpaid Card

Tubing and Fittings

Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Technical data card TDC-192 describes the high temperature properties of B&W Croloy 25-12 (309), its composition, size ranges in addition to short time tensile and rupture properties.

For more data circle 18 on Postpaid Card

Dimensional Standards for Rivets

Tubular and Split Rivet Council, 53 Park Place, New York 7, N. Y. "Dimensional Standards for Semi-Tubular Rivets" presents, in easy to read chart form, such information as body and head diameters, head thicknesses and radii, and hole diameter and depth figures.

For more data circle 19 on Postpaid Card

Impact Tool

Ingersoll-Rand, 11 Broadway, New York 4, N. Y. Form No. 5244 presents the Size 804 Impactool with $\frac{3}{8}$ inch capacity.

For more data circle 20 on Postpaid Card

just ONE heavy duty unit services up to 19 MACHINES

DUSTKOP[®] STOPS DUST

In the complete line of Aget Dust Collectors there are sizes that will service from one to nineteen machines—large or small. Some exhaust cleaned air externally . . . others clean and recirculate air within your plant. Write for illustrated folder . . . today.

46 Standard Models—Ready to Use

AGET manufacturing company
1398 Church Street • Adrian, Michigan

For more data circle 453 on Postpaid Card

free literature . . .

Metal Cutting Shears

Beverly Shear Manufacturing Co., 3000 West 111th St., Chicago 43, Ill. Bulletin CC-159. Four page bulletin features pneumatic shears, inside slotters, slitting shears, electric throatless nibbling shears and so on.

For more data circle 21 on Postpaid Card

Lubricants

Chicago Manufacturing and Distributing Co., 1910 West 46th St., Chicago 9, Ill. Four page bulletin on CMD Anti-Scoring Lubricants for high production.

For more data circle 22 on Postpaid Card

Drilling Tool

Jancy Engineering Co., Davenport, Iowa. Four page, color bulletin describes and illustrates the new Jancy Roto-Bor, a tool that successfully drills accurate holes in both light and heavy gauge sheet metal, plate, stainless steel, brass, aluminum, plastics, fibers, cork, rubber, honeycomb and paper.

For more data circle 23 on Postpaid Card

Hardness Testers

Clark Instrument, Inc., 10204 Ford Road, Dearborn, Mich. This 18 page catalog gives valuable information on Clark Hardness Testers and related equipment. For more data circle 24 on Postpaid Card

Milling Machine Vises

E. R. Dugas Machine Works, 620 Yuma Court, Dallas, Texas. Two bulletins describe the Models 66 and 86 Heavy Duty Milling Machine Vises, that are guaranteed by the company for one year against breakage.

For more data circle 25 on Postpaid Card

24 Inch Lathe

Homestrand, Inc., Larchmont, N. Y. Brochure describes the new 24 inch Koping Lathe.

For more data circle 26 on Postpaid Card

Special Taps, Dies and Gages

Field Tool Supply Co., Department SP, 33 South Desplaines St., Chicago 6, Ill. Bulletin gives complete size information on right and left hand high speed taps, dies and thread plug gages. Other products described are special reamers and extra length drills.

For more data circle 27 on Postpaid Card

Northwestern

FREE NEW-16 PAGE CATALOG

WRITE FOR YOUR COPY TODAY

JIG AND FIXTURE COMPONENTS

Latch Bolts	Jig Feet (3 Types)
Cast Iron Hand Knobs	Spherical Washers
Aluminum Hand Knobs	Fixture Keys
Quarter Turn Screws	Knurled Head Screws
Shoulder Screws	Toggle Shoe Clamps & V-Pads

HOLD DOWN AND CLAMPING TOOLS

T-Nut & Stud Sets	Tee Nuts
Step Block & Clamp Sets	Coupling Nuts
Flanged Nuts	Adjustable Step Blocks
Cut Thread Studs	Strap Clamps (Plain & Step Type)

CATALOG INCLUDES TRACING TEMPLATES

119 HOLLIER AVE.,
DAYTON 3, OHIO

NORTH
WESTERN

For more data circle 454 on Postpaid Card

Tape Control Positioning

Jones and Lamson Machine Co., 512 Clinton St., Springfield, Vt. Form LO-5902 is a new ten page brochure on J and L tape controlled positioning. It describes the advantages of this method and illustrates various applications. The booklet tells that Retrofitting (or do it yourself) applications may be accomplished with packaged positioning units. For more data circle 28 on Postpaid Card

Gear Deburring Process

Barber-Colman Co., 7611 Rock St., Rockford, Ill. and Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul 6, Minn. Form 9093 describes and illustrates a new process for high speed gear deburring, using both a new wheel and machine.

For more data circle 29 on Postpaid Card

Machinists' Tools

Brown and Sharpe Manufacturing Co., Providence 1, R. I. Catalog No. 37M. This catalog of 48 pages lists the Brown and Sharpe tools generally used by machinists and toolmakers.

For more data circle 30 on Postpaid Card

Gun Drills

Cleveland Twist Drill Co., 1242 East 49th St., Cleveland 14, Ohio. A new gun drill manual contains a great amount of helpful information on all phases of gun drilling. This 16 page book explains how gun drills can be used on critical drilling jobs involving fine finish, accurate size, pinpoint location and holes of all depths. For more data circle 31 on Postpaid Card

Precision Surface Grinder

Covel Manufacturing Co., Benton Harbor, Mich. Bulletin 179 presents the Covels Nos. 17 and 17H large capacity, low cost, precision surface grinders (No. 17H, hydraulic and No. 17, hand feed). For more data circle 32 on Postpaid Card

Toolholder Bushings

Gahr Machine Co., 19199 St. Clair Ave., Cleveland 19, Ohio. Data sheet contains complete specs and prices for split and solid types of toolholder bushings, available in a wide range of bore sizes.

For more data circle 33 on Postpaid Card

WRITE NOW FOR
THIS

**FREE
CATALOG**

ON
WORK HOLDING
TOOLS FOR
PRODUCTION, TOOLING, MAINTENANCE



Drill press vises, angle vises, swivel machine vises, rotary tables, lathe milling attachments, production vises, heavy duty angle vises, and adjustable angle plates are illustrated and fully described in the New Palmgren Catalog. This is the only complete line of work holding devices available anywhere. Designed for production, tooling, and maintenance work, there are 68 different models and types to choose from. Vise jaw sizes are from 1½" to 8". Ask for your copy of this FREE Catalog No. 205 today. The complete line with details and prices are shown.

PALMGREN PRODUCTS

by CHICAGO TOOL AND ENGINEERING CO.
8399 SOUTH CHICAGO AVE. • CHICAGO 17, ILL.

For more data circle 455 on Postpaid Card

free literature . . .

Vibrator Testers

All American Tool and Manufacturing Co., 8043 Lawndale Ave., Skokie, Ill. Bulletin 3759 describes eight models of mechanical vibrator testers.

For more data circle 34 on Postpaid Card

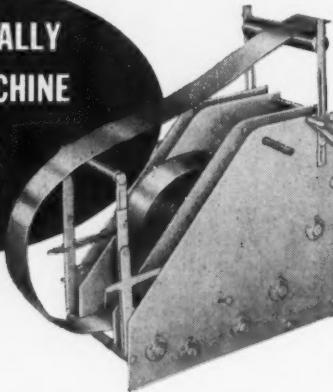
Power Saw

DoAll Co., Des Plaines, Ill. Form 59-12 describes and illustrates the cut off capacity and operating ease of the Model C-24 Power Saw.

For more data circle 35 on Postpaid Card

AUTOMATICALLY
FEED ANY MACHINE
FROM THIS
SLACK LOOP

for greater
accuracy
and production!



Koil Kradles form a slack loop between coil and machine from which any automatic feed can freely draw! The slack loop eliminates drag and resistance of pulling against heavy coils. Reduced drag improves accuracy of any feed device . . . records show up to 80% more footage handled per shift!

Koil Kradle's variable timer delays shut-off up to 10 seconds after motor switch trips off . . . forms a new slack loop before stopping; eliminates many unnecessary motor starts and stops! Adjustable plates center various coil widths; reversible motor for rewinding; power driven rolls; anti-friction bearings and numerous other features!

ASK FOR CIRCULARS, sizes and prices. Stock widths up to 50", coil weights to 20,000 lbs.

benchmaster

World's largest
manufacturer of small punch
presses and mills.



1835 W. Rosecrans Avenue • Gardena, California

For more data circle 456 on Postpaid Card

180 modern machine shop

Lubricators

Bijur Lubricating Corp., 151 West Passaic St., Rochelle Park, N. J. Bulletin NB-23 describes and illustrates several applications of Bijur Lubricators.

For more data circle 36 on Postpaid Card

Pressure Plugs

Standard Pressed Steel Co., Box 556, Jenkintown, Pa. Form 2501 describes Levi-Seal Non-Protruding Pressure Plugs that seat flush.

For more data circle 37 on Postpaid Card

Protective Coating

Turco Products, Inc., 6135 South Central Ave., Los Angeles 1, Calif. Bulletin No. 67 gives technical product data on Turco Fabrifilm, an easily removable protective coating.

For more data circle 38 on Postpaid Card

Swivel Vise

J and S Tool Co., Inc., 871 Dorsa Ave., Livingston, N. J. New literature describes the new J and S ClampCut Vise. The many features of this hardened and ground swivel vise and its versatility are fully explained.

For more data circle 39 on Postpaid Card

Boring Tools

Giddings and Lewis Machine Tool Co., Davis Division, Fond du Lac, Wis. Catalog No. D-510 presents a complete new pricing structure for block type boring tools.

For more data circle 40 on Postpaid Card

End Mills

Arrow Tool and Reamer Co., 711 Stephenson Highway, Troy, Mich. Catalog No. 59 gives data on tool engineering service, special tools—both carbide

July, 1959

tipped and high speed steel—subland drills and end mills.

For more data circle 42 on Postpaid Card

Wet Blaster

Tobin-Arp Manufacturing Co., 6400 Penn Ave., South, Minneapolis 23, Minn. Flyer gives specifications and other important information on the Tamco Liqui-Breez floor model wet blaster.

For more data circle 43 on Postpaid Card

Spacing Products

Detroit Stamping Co., 349 Midland Ave., Detroit 3, Mich. Three new catalog inserts describe collars, feeler stock, brass and steel shim stock and a complete line of arbor spacers and shims.

For more data circle 44 on Postpaid Card

Metal Lathes

Rockwell Manufacturing Co., Delta Power Tool Division, 606 B North Lexington Ave., Pittsburgh 8, Pa. Form AD-1177 is a 20 page, four color catalog that describes and illustrates the complete line of Delta industrial metal lathes.

For more data circle 45 on Postpaid Card

Magnesium Alloys

Dow Chemical Co., Midland, Mich. "Shop Guide for Elevated Temperature Magnesium Alloys" is a new 28 page booklet that describes recommended practices for working magnesium alloys of the thorium and rare earth metal families.

For more data circle 46 on Postpaid Card

Jig Borer

Pratt and Whitney Co., Inc., 25 Char-

ter Oak Boulevard, West Hartford, Conn. Circular No. 622 presents the No. 4EA Jig Borer featuring numerical control, giant capacity, tenths precision and a built in rotary table.

For more data circle 47 on Postpaid Card

Sprockets and Roller Chains

Cullman Wheel Co., 1344 Altgeld St., Chicago 14, Ill. Catalog No. 60 is a comprehensive, illustrated engineering and stock catalog on sprockets and chains. 88 pages gives full details on 1,300 different stock sprockets and various types of roller chains.

For more data circle 48 on Postpaid Card



*Six machines protected from dust
by Torit for* **\$666 15**

This Torit Dust Collector, Model 219FM, complete with accessories, was installed by the Mohr Lino Saw Co., Skokie, Ill., to protect 3 belt sanders and 3 other grinders (2 grinders hidden from view) from destructive dust—at a total cost of just \$666.15!

After one year's operation, Mohr Lino Saw says this about their low-cost Torit installation: "The Torit installation has kept our shop cleaner, our operators happy, and protected vital machinery."

You too can achieve greater machine protection and cleaner working conditions by trapping dangerous or valuable dust at its source with a completely self contained and portable Torit Dust Collector. For full details write to:

TORIT MANUFACTURING CO.

Dept. 703, Walnut & Exchange Sts., St. Paul 2, Minn.

For more data circle 457 on Postpaid Card



free literature . . .

Grinding and Finishing Wheel

Bay State Abrasive Products Co., Westboro, Mass. Form 14 presents data on the Bayflex Double Duty Wheel that grinds and finishes.

For more data circle 49 on Postpaid Card

Fabrication

Kirk and Blum Manufacturing Co., Cincinnati 9, Ohio. 40 page catalog lists more than 100 different parts and assemblies, from massive boiler breechings to

smallest stampings. This sheet and plate fabrication catalog spotlights photographically the extensive facilities and equipment for product production.

For more data circle 50 on Postpaid Card

Chucks

Supreme Products Corp., 2222 South Calumet Ave., Chicago 16, Ill. Form No. 343 includes a complete specification chart of the line of Supreme Chucks.

For more data circle 51 on Postpaid Card

Portable Pneumatic Grinders

Thomas C. Wilson, Inc., 21-11 Forty-Fourth Ave., Long Island City 1, N. Y.

Catalog PT-58 is a twelve page illustrated, loose leaf type catalog that provides data on pneumatic die grinders, horizontal grinders and auxiliary related equipment.

For more data circle 52 on Postpaid Card

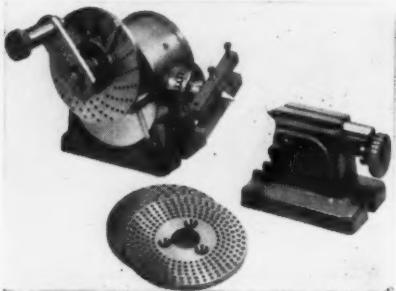
Counters

Veeder-Root, Inc., Hartford 2, Conn. Form No. 227687 is a condensed catalog that shows the new high speed electronic counters, made by the Electronic Controls Division. It also shows some of the various products made by the company's Instrument-Type Counter Division.

For more data circle 53 on Postpaid Card

LW DIVIDING HEADS

Accurate,
Heavy
Duty



Ball bearing thrust on worm shaft and rear end of spindle. Headstock spindle has threaded nose. Large tapered bearing adjustable for end play. Head tilts past 90°. Worm wheel and alloy stress-proof steel worm cut to close limits for accuracy. Worm wheel and worm shaft can be fully disengaged. Complete with three index plates for dividing all numbers to 50 and even numbers to 100 except 96. Index chart shows all divisions obtainable to 380. Right or left hand models.

MODEL SD (Shown above). 6 1/2" Swing. Spindle threaded 1 1/2"-8. 9/16" table slot tongues. 36 lbs. \$ 175.00

MODEL BP. 11" Swing for plain milling machine. Spindle threaded 2 1/4"-10. 5/8" table slot tongues. 140 lbs. \$ 295.00

MODEL AU. 11" Swing. Fully universal for complete indexing and spiral cutting. Spindle threaded 2 1/4"-10. 5/8" table slot tongues. 190 lbs. \$ 460.00

See your dealer or order direct, giving dealer's name.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



L-W CHUCK COMPANY 28 SO. ST. CLAIR ST.
TOLEDO 4, OHIO

For more data circle 458 on Postpaid Card

Carbide Cutters

Quality Tool Works, 792 South Market, Waukegan, Ill. New catalog lists the stock sizes of Quality Carbide Woodruff Keyseat Cutters, that are available from stock. Sizes range from $\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter.

For more data circle 54 on Postpaid Card

Lapping and Grinding Compounds

Clover Manufacturing Co., Norwalk, Conn. Section B, Page 2. Water soluble lapping and grinding compounds and grease-mixed lapping and valve-grinding compounds are described.

For more data circle 55 on Postpaid Card

Plate Magnet

Stearns Magnetic Products, 635 South 28th St., Milwaukee 46, Wis. Bulletin 1074 describes Indox V Plate Magnet models. It gives detailed selection data on the correct magnet for existing chutes,

ducts, conveyors or other material handling equipment.

For more data circle 56 on Postpaid Card

Metal Cleaning Guide

Magnus Chemical Co., Inc., MMS South Ave., Garwood, N. J. Bulletin M240 is a series of charts in handy file folder form. It will simplify the task of selecting the correct cleaning method and chemical for the various metals and soils which are likely to be encountered in the metal-working and finishing fields.

For more data circle 57 on Postpaid Card

One of these Wilson "Rockwell" instruments will do your hardness testing job

No matter what your hardness testing requirements are, there's a Wilson "Rockwell" tester to do the job. Choose from this complete selection of hardness testing equipment:

"Rockwell" Hardness Tester—for most hardness testing functions.

"Rockwell" Superficial Tester—for extremely shallow indentations.

TwinTester—Combines functions of "Rockwell" and "Rockwell" Superficial testers.

Semi and Fully Automatic—for high-speed testing, at rates up to 1,000 pieces per hour. Automatically classifies pieces as CORRECT, TOO HARD, or TOO SOFT.

Special Machines—for testing large objects, internal readings, and other unusual applications.

Diamond "Brake" Penetrators—Flawless diamonds, individually calibrated, and highest quality construction assure perfect testing every time.



**Write for
Bulletin RT-58**

WILSON "ROCKWELL" HARDNESS TESTERS



**Wilson Mechanical Instrument Division
American Chain & Cable Company, Inc.**

230-G Park Avenue, New York 17, New York

For more data circle 459 on Postpaid Card

July, 1959

modern machine shop

183

free literature . . .

Gear, Hob and Cutter Checker

Michigan Tool Co., 7171 East McNichols Road, Detroit 12, Mich. Bulletin No. 471 covers the various uses of universal fixtures for checking gears, hobs and cutters. This is a four page, well illustrated bulletin.

For more data circle 58 on Postpaid Card

Drills

Cogdill Twist Drill Co., Greenfield, Mass. Catalog No. 359 consists of 68 pages, 44 of which are devoted to

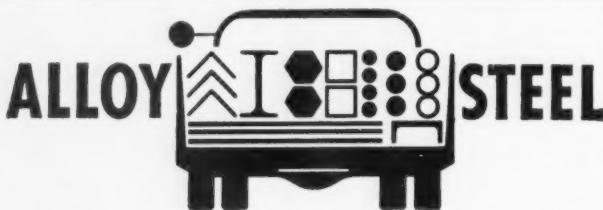
engineering data on drills and drilling procedures. Information is included on center drills, combined drills and countersinks, counterbores, drill sets, screw extractors and sets, spotting and centering drills and twist drills.

For more data circle 59 on Postpaid Card

Tapping, Drilling and Boring Units

Drillmation Co., Inc., 6500 East Eleven Mile Road, Center Line, Mich. Ten page color folder called, "The 'Hole' Issue on Holes", explains how and why precision tapping, drilling and gun boring is being used to reduce the cost of ordinary metal cutting operations, using the company's line of Tapmation, Drillmation and Boremation Power Units.

For more data circle 60 on Postpaid Card



whether you require standards, or the best in specials, there's a W-L warehouse near you —

Wheelock, Lovejoy maintains seven strategically-located warehouses. All of them are completely staffed and completely stocked, to fill your alloy steel needs promptly. Standard AISI and SAE steels, and our own special HY-TEN steels offering advanced metallurgical features at competitive prices, can be had in bars, billets and forgings, in specified sizes, shapes and treatments.

Write today for *free* Wheelock, Lovejoy Data Sheets, containing complete information on grades, applications, physical properties, tests, heat treating, etc.

**WHEELOCK,
LOVEJOY
& COMPANY, INC.**

140 Sidney Street, Cambridge 39, Mass.

For more data circle 460 on Postpaid Card



Cutting Oils

Gulf Oil Corp., Department DM, Gulf Building, Pittsburgh 30, Pa. "Pour Savings into Your Shop with Gulfcut Oils" tells about ten different types of cutting

oils, that provide for every metal cutting need.

For more data circle 63 on Postpaid Card

Band Sawing Machines

W. F. Wells and Sons, Three Rivers, Mich. A new four page cover folder, with eight separate insert sheets all in color, describes nine different ways to profit with horizontal metal cutting band saws. For more data circle 64 on Postpaid Card

Carbide Hand Files

Severance Tool Industries, Inc., 724 Iowa St., Saginaw, Mich. General Catalog. Pages 15 and 16 describe and illustrate carbide hand files, which can be resharpened many times.

For more data circle 65 on Postpaid Card

Deburring and Finishing Unit

Almco, Queen Products Division, King-Seeley Corp., Albert Lea, Minn. Form B-27-S describes and illustrates the SuperMite Portable Deburring and Finishing Model. It is ideal for laboratories, job shops, research departments and manufacturers with limited finishing needs.

For more data circle 66 on Postpaid Card

Air Operated Chucking System

Cushman Chuck Co., Hartford 2, Conn. Bulletin PO-66D illustrates and gives a complete listing of the line of standard air chucks and cylinders, and typical applications with detailed installation procedure.

For more data circle 67 on Postpaid Card

Hydraulic Tracer Mills

Famco Machine Co., 3122 Sheridan Road, Kenosha 6, Wis. Four page brochure on True Trace Hydraulic Tracer Mills describes in detail the great variety of work that can be performed on Famco True Trace.

For more data circle 68 on Postpaid Card

Drilling and Tapping Machine

Universal-Automatic Corp., 9545 Ainslie St., Schiller Park, Ill. Reprint of article entitled "Automate your Secondaries" gives typical parts and production data for single spindle horizontal drilling and tapping machines.

For more data circle 69 on Postpaid Card

Machining of Aluminum

Reynolds Metals Co., Department PRD-10, Box 2346, Richmond 18, Va. "Auto-

NOW! Cut Costs! Use Highest Precision WOHLHAUPTER Facing and Boring Masterheads

Facing, Boring, Turning, Recessing, Undercutting, Underfacing and Tapercutting

- Automatic Feeds
- Automatic End Release
- 9 Sizes for Work to 36 $\frac{1}{4}$ "
- 12 Feeds in Larger Models

Also Tapercutting Heads for 0-180°

FREE! For illustrated catalog containing complete technical data, write today!

Sole Agents
KARL A. NEISE
Dept. MM-79
404 - 4th Ave., N.Y.C. 16

For more data circle 461 on Postpaid Card

free literature . . .

matic Screw Machining of Aluminum" is a new technical handbook that contains 32 pages of reference data on all phases of the light metal's use in this demanding operation.

For more data circle 70 on Postpaid Card

Stainless Steel Fastenings

Star Stainless Screw Co., 699 Union Boulevard, Paterson 2, N. J. A full range of sizes and types in AN and MS fasteners are among the brand new items in Catalog No. 59-A. Over 7,000 items and sizes in stainless steel fastenings are available.

For more data circle 71 on Postpaid Card

Diamond Wheels

Carborundum Co., Building W-5, Walmore Road, Niagara Falls, N. Y. Form A-1504 describes diamond wheels (both natural and man-made) for carbide grinding.

For more data circle 72 on Postpaid Card

Monitor

Go-Devil Instrument Co., 624 Dutchess Turnpike, Poughkeepsie, N. Y. Bulletin 359 describes and illustrates the improved Go-Devil Monitor, described as a self-mastering comparator, measuring machine and dial indicator checker that requires no setting masters.

For more data circle 73 on Postpaid Card

Gages

Hawkeye Specialty Co., 1532 West 14th St., Davenport, Iowa, Four page, color bulletin describes such products as a jig bore special set, the Checkall, groove gage, taper gage, cross hole gage and concentricity gage.

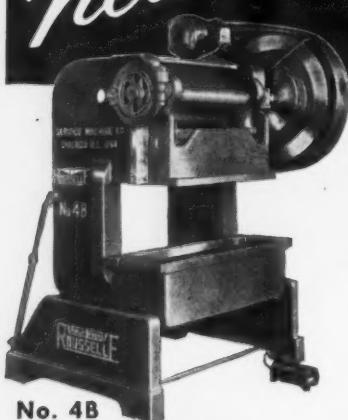
For more data circle 74 on Postpaid Card

Aluminum Machining Chart

Peter A. Frasse and Co., Inc., 17 Grand St., New York 13, N. Y. Sec. G, No. 2 is a new aluminum machining chart that provides tables of recommended speeds and feeds for six different machining operations.

For more data circle 75 on Postpaid Card

New 40-TON DOUBLE CRANK O.B.I.
Rousselle

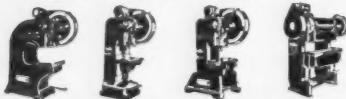


No. 4B
ROUSSELLE PRESS

**WITH NEW ELECTRICALLY
CONTROLLED AIR CLUTCH**

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES



SERVICE MACHINE CO.

Mfrs. of Rousselle Presses

2310 WEST 78th STREET • CHICAGO 20, ILL.

ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS

For more data circle 462 on Postpaid Card

Flexible Shaft Machines

Foredom Electric Co., Inc., Bethel, Conn. Catalog 210 describes flexible shaft machines, designed especially for small work industrial grinding, finishing and deburring.

For more data circle 76 on Postpaid Card

Electric Heating Units

Hevi-Duty Electric Co., Milwaukee 1, Wis. Bulletin No. 158A shows diagrams, dimensions, wattages and prices of a complete line of semi-cylindrical electric heating units.

For more data circle 77 on Postpaid Card

Ram Type Millers

Van Norman Machine Co., Springfield 7, Mass. Catalog gives information on ram type milling machines, that handle greater capacity of work and provide more usable horsepower.

For more data circle 78 on Postpaid Card

Triple Operation Lathe

Carl Hirschmann Co., Inc., 30 Park Ave., Manhattan, N. Y. An eight page, short form catalog describes the extreme versatility of the Schaublin SV-102 Lathe. It can be used as a toolmaker's, second operation or as a turret lathe.

For more data circle 79 on Postpaid Card

**when millionths count...
hold them with**

***Myford 5" x 12"*
Cylindrical Grinders**

Exclusive Features—Unbeatable Price!

- Cartridge type nitr alloy wheel spindle—rapidly interchangeable.
- Long tapered, phosphor bronze, pre-loaded twin angular contact precision bearings with forced lubrication.
- Wheel feed with hardened threadground feedscrew.
- Fine infeed to dead stop, sensitive to and graduated in 25 millionths.
- D.C. live and dead workhead speed selection (75 to 780 rpm)
- Internal Grinding Attachment (17,500 and 22,000 rpm).
- Full range of accessories including Collet Att. Swivelling Workhead, Angular and Radius Dressers, etc.

Engineered to grind:

Round to .00002"

Parallel to .00001"

Finish to .3 microinches

For 8 page Catalog and nearest dealer write to:

BENTLEY INDUSTRIAL CORPORATION

10 Years of Dependable Service to Industry

41 East 42 Street—Dept. E-7, New York 17, N.Y.

For more data circle 463 on Postpaid Card

\$2395



new shop equipment

**Descriptions of new machines, tools
and materials for metalworking.**

SEVEN STATION CRANKPIN GRINDER

A seven station crankpin grinder, believed to be the largest and most expensive grinding machine ever built, has successfully completed builder's trials at Norton Co., Worcester 6, Mass. Known as the Norton No. 2 Unitized Transfer Type Automatic Crankpin Grinding Machine, it was designed to finish grind the pins on up to 60 automotive type crankshafts per hour under completely automatic oper-

ating conditions. It is 19 feet wide and 90 feet long. When loaded on railroad cars for shipment, it will tip the scales at 135 tons. The grinder consists of seven grinding stations, connected by a transfer system. All grinding, loading, unloading, size control, gaging and wheel truing is done automatically. An operator is required only to make adjustments and to take corrective steps if the lights on the control panel indicate trouble. In the No. 2, manual lifting is entirely eliminated. Cranks are brought to the grinder by

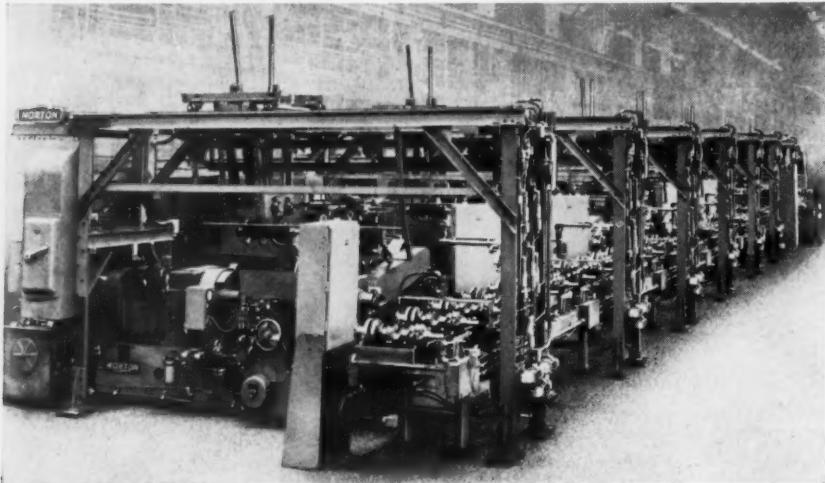


Figure 1—The Norton No. 2 Unitized Transfer Type Automatic Crankpin Grinder

and shop materials

Edited by L. L. BALDHOFF

conveyor. An overhead transfer carriage, at right angles to the conveyor, brings the cranks from the conveyor to the grinding position. The carriage has two sets of hooks. One removes the ground crank and the second lowers an unground crank into the work holding blocks as soon as the first crank is clear. Time that wheel is not in contact with the work during the one minute cycle is 17 seconds.

While grinding is in progress, the overhead carriage returns the ground crank to a position over the conveyor, picks up another unground crank, deposits the ground crank on the conveyor and transfers the unground crank to a position over the grinding station, to be lowered at the next cycle.

During the 17 seconds that the wheel is not in contact with the work, the truing process takes place.

Because the pin on a crankshaft is not on the crank's centerline, proper angular location in offset, counterweighed workholder blocks is essential to place the desired pin axis exactly on the axis of the work rotation as determined by the head and foot stocks. This machine accurately locates the work angularly to within 0.002 inch of the exact position.

Axial location must also be precise in crankpin grinding. Once the crank is angularly located, an axial locator comes into play. As the oval shaped cam rotates between the cheeks of the

crank, it aligns the crank axially so that the wheel grinds an equal amount on each cheek. After alignment, the locator retracts, the crank is clamped and the grinding cycle begins.

At the end of the grinding cycle, the headstock drive is so controlled that the work holding blocks are brought to a correct stopped position to discharge and receive the cranks. The seventh station is an extra station. It can be used as a substitute for any of the other stations, which may be shut down.

For more data circle 80 on Postpaid Card

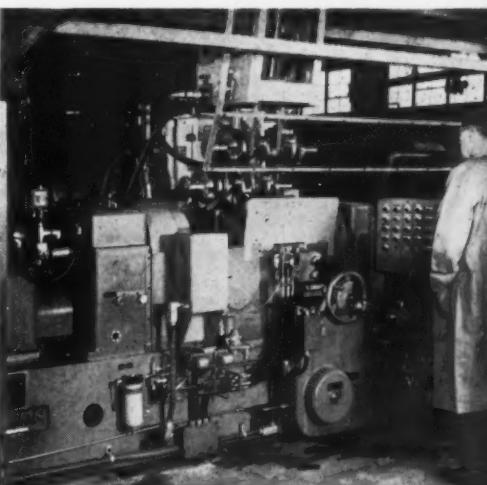


Figure 2—The master control station

new shop equipment . . .

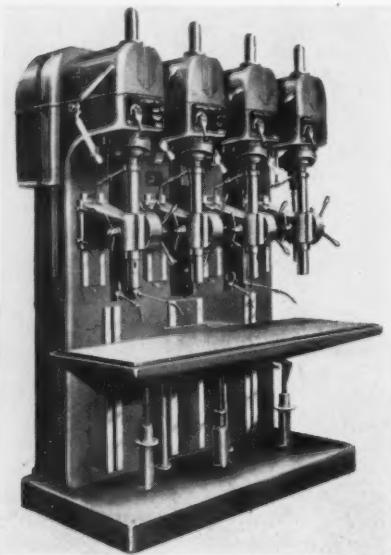
IMPROVED VARIABLE SPEED DRILL

Buffalo Forge Co., 388 Broadway, Buffalo, N. Y., announces the redesigned R-P-Mster Variable Speed Drill that now offers greater capacities and new torque controlled power feed in addition to many other desirable features. New capacities in mild steel are: No. 1A, 1 inch; No. 2A, 1½ inches; No. 3A, 2 inches.

R-P-Mster power feed consists of an all geared positive feed with a torque device on the feed shaft. This device is factory set for maximum torque. Overload causes slippage, preventing damage to the machine.

Offered in one to six spindle models, these hand scraped, hand fitted drilling machines are available with standard and special accessories.

For more data circle 81 on Postpaid Card



Buffalo Forge Variable Speed Drill

190 modern machine shop



Petermann Swiss Automatic Screw Machine

AUTOMATIC SCREW MACHINES

The Arthur Loeffel Co., Inc., Merrick, N. Y., announces the Petermann Swiss Automatic Screw Machines. These models feature quality, workmanship and dependability. Other features include: six or four spindle turrets with ultra-fast indexing; micro differential micrometers; plan-lever flat cam headstock advance; built-in gear box for both feed and spindle speed settings; headstock with Nadella needle bearings; electronic cam shaft variator; fully automatic lubrication.

To eliminate as much as possible the secondary operations, which are always costly and often not to the accuracy required, it is desirable to complete a component as far as it can possibly be done on the automatic screw machine itself. To comply, naturally means that it is necessary to be able to use an increasing number of tools, especially drilling, threading and grooving. The Petermann Automatics, with six transversal tools and turrets with six or four spindles and multiple combinations, offer the easy solution of a considerable number of problems.

For more data circle 82 on Postpaid Card

July, 1959

PROCESS FOR FORMING CYLINDRICAL PARTS

A new metalworking process for forming tall, shell type, cylindrical parts has been developed by the Floturn Division, Lodge & Shipley Co., 3058 Colerain Ave., Cincinnati 25, Ohio. Known as "Flo-Reforming," the process is based on the use of a Floturn Machine plus one or more "Reforming" operations performed on a press, using Reform tools.

Basically, the process produces parts similar to those ordinarily made with deep drawing techniques, but with important metallurgical and cost ad-

vantages. Lower tooling costs make short runs practical.

A typical example cited was the production of 500 stainless steel shells, 3 inch o.d. by 7.125 inch deep with a 0.042 inch wall thickness. The deep drawing method involved a total of ten shearing, drawing, washing and annealing operations. The Flo-Reform process had six operations; showed a 28 percent saving in cost.

In producing the part by Flo-Reforming, Lodge & Shipley starts with a 6 7/16 inch round blank, including a 1/8 inch trim allowance, 0.125 inch thick. Using a No. 12 Vertical Floturn machine, the blank is formed into a truncated cone which is washed and annealed and then Reformed into the straight-side cylinder by a single Reform operation.

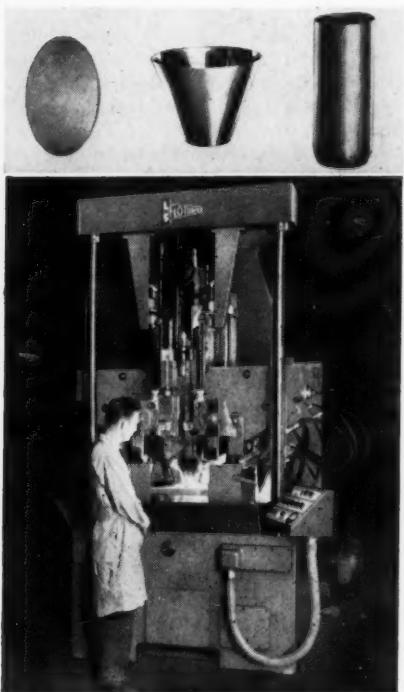
One of the many distinctions between deep drawing and Flo-Reforming, pointed out by Lodge & Shipley, is that diameter reductions (with part height increases as a by-product) are the basis of deep drawing. In Flo-Reforming, the finished diameter of the workpiece is "built-into" the part in the Floturn operation and remains unchanged through the Reform operation, which produces the straight sides.

For more data circle 83 on Postpaid Card

★ modern machine shop ★

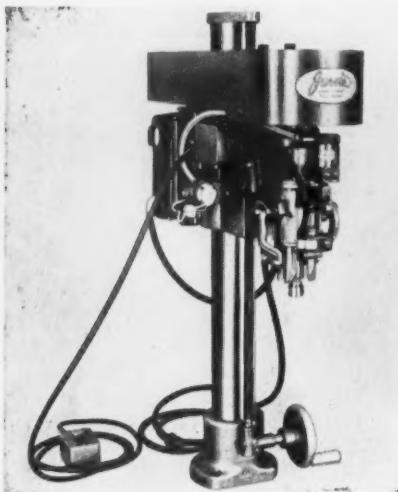
LEAD SCREW TAPPERS ARE FULLY AUTOMATIC

Jarvis Corp., Middletown, Conn., announces an automatic, adjustable pitch lead screw tapper, adaptable to any drill press table. The unit is furnished in five standard models and has four speed pulleys, giving speeds of 575, 958, 1,437 and 2,415 r.p.m. Tapping cycle is completely automatic—through air and electrical controls—and can be interconnected with the controls of an indexing table, if desired. Tap depth is electrically controlled



Shown above is the sequence of operations (round blank, Floturn cone, reforming completed) that can be performed on a Lodge & Shipley No. 12 Vertical Floturn Machine

new shop equipment . . .



Jarvis Adjustable Pitch Lead Screw Tapper

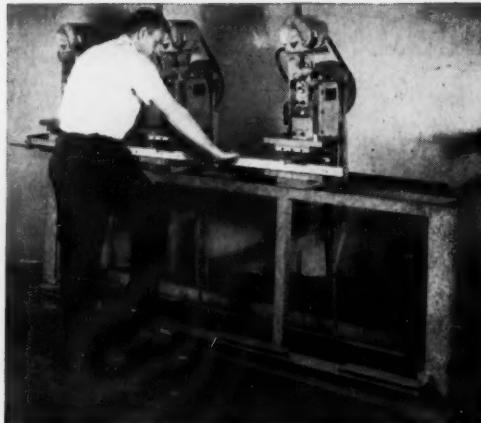
and can be set to any depth within the stroke of the lead screw unit, which features rapid conversion from one pitch to another.

For more data circle 84 on Postpaid Card

★ modern machine shop ★

**PUNCH PRESS USED
IN GANG POSITIONS**

A development in multiple tooling is announced by Fallsington Mfg. Co., Fallsington, Pa., whereby Fallsington Punch Presses can be used in gang positions, and quickly set up so that multi-station jobs requiring piercing, blanking and forming can be done in one operation. Presses are designed for quick positioning by means of a rack and pinion on a steel table, thereby increasing the flexibility and productivity of the punch presses. In addition to being used as multiple set-ups, the presses can be used singly. Fallsington All-Steel Presses are of



Fallsington Punch Presses in gang position

all welded steel construction and are available in 3 and 5 ton capacities. All presses have a repeat or non-repeat clutch. For simultaneous tripping, they can be equipped with air tripping equipment. Tables are designed to customer specifications. The number of presses that can be used at one time is literally unlimited.

For more data circle 85 on Postpaid Card

★ modern machine shop ★

**MACHINE AND WHEELS OFFER
NEW CONCEPT IN
GEAR DEBURRING**

Barber-Colman Co., Dept. F9-154, Rockford, Ill., and Minnesota Mining and Mfg. Co., Dept. F9-154, 900 Bush Ave., St. Paul 6, Minn., have jointly announced a new concept in the automatic deburring of gears and sprockets, which combines coated abrasives with a machine tool operation. Two of the major advantages of the method are: consistency in profile from tooth to tooth and from gear to gear; and complete protection for the gear face, which is often subject to impingement when using other types of methods.

The deburring is accomplished as a specially designed, formed "PG" Wheel moves by hydraulic action into working position, automatically feeds into contact with the gear and retracts to the starting position at the end of a prespecified contact period—all on a pushbutton cycle. The wheel and gear spindles operate in a timed relationship, so that the work indexes one tooth for each revolution of the wheel.

The "PG" Wheel is made of hundreds of die cut leaves of coated abrasive—in this instance aluminum oxide mineral resin-bonded to a cloth backing—fabricated into a wheel and locked at the hub with aluminum flanges.

The formed wheel permits the grinding of a small chamfer on the complete tooth profile, which is especially important on helical gears where the acute angle on one side of the profile

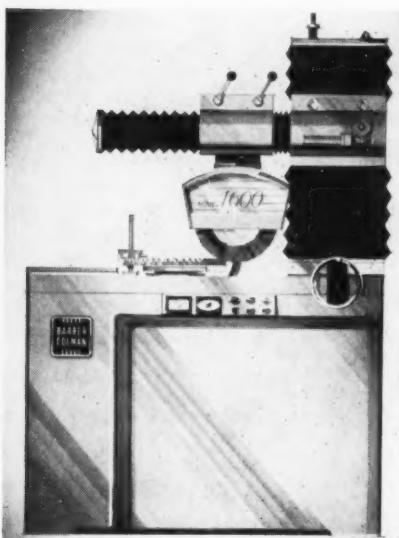


Figure 1—Shown is the Model 1600 Barber-Colman Gear Deburring Machine. This unit uses "PG" Wheels for deburring helical and spur gears, as well as sprockets.



Figure 2—This is how the "PG" Wheel contacts the workpiece. Wheel and gear are in timed relationship, so gear indexes one tooth for each revolution of wheel.

may distort or burn during hardening.

The deburring machine and the method are the result of Barber-Colman's machine tool know-how and the research of the 3M company into the field of coated abrasive applications. The system is intended to replace wire brushing, some types of tumbling, hand filing and hand deburring, and is adaptable for long or short run deburring of gears and sprockets.

Production models of the machine, manufactured and sold by Barber-Colman employ "PG" Wheels in 6 to 14 inch diameters and the Model 1600 will accommodate gears up to a 16 inch o.d. Larger capacity machines can be built.

This coated abrasive method completely removes the burr around the entire tooth form in addition to being able to produce a controlled chamfer where required.

In addition to the formed wheel version of the process in which a "PG" wheel is preformed to the exact shape of the workpiece the new method permits the use of an oscillating "PG" Wheel which requires no forming. The

new shop equipment . . .

wheel does, however, have several annular slots which provide increased flexibility. The feature of the oscillating method is that the wheel and workpiece need not be in a timed relationship. Finish is about the same, except that the oscillating wheel produces a slightly larger, less precise chamfer than does the formed wheel. Production models of the deburring machine will utilize either method.

The "PG" Wheel provides a clean deburring or finishing operation because the abrasive mineral and the cloth backing wear away together, and this action assures a sharp wheel at all times, since fresh mineral grain is always being presented to the work.

In addition, because the coated abrasive leaves tend to become firmer or stiffer as they grow shorter, there is no need to vary the speed of the wheel to compensate for the smaller diameter and the decreasing perimeter velocity. Even as the diameter of the wheel becomes smaller, it remains in timed relationship with the work.

The "PG" Wheel is formed in the user's plant. A Type C Disc is cemented to the face of the workpiece, and this overhanging part of the disc is cut away to expose the gear teeth. The wheel is then forced into contact with the forming tool until the proper form is imparted to the wheel.

For more data circle 86 on Postpaid Card

★ modern machine shop ★

MILLING MACHINE FEATURES HYDRAULIC FEED

Northern Illinois Machinists, Crystal Lake Rd., McHenry, Ill., announces the Hydromill that features hydraulic feed, giving positive and foolproof operation. The hydraulic system is unique in that it has only three main parts for easy and quick service and



Northern Illinois Machinists "Hydromill"

provides changeover on feeds in less than a minute.

Specifications of the mill include a table with a working surface of 8 by 32 inches, longitudinal table travel of 12 inches and transverse table travel of 7 inches. The spindle is mounted in Timken bearings and is equipped with a No. 40 standard taper. With the standard 3 h.p., 1,140 r.p.m. motor, the spindle provides a range of ten different speeds from 75 to 2,700. The feed may be set from right to left and rapid return, from left to right and rapid return, or from right to left and stop, then left to right and stop, for use with two fixtures. Feed range is 0 to 600 inches per minute.

For more data circle 87 on Postpaid Card

★ modern machine shop ★

PIPE JOINT SEALER IS INERT TO DESTRUCTIVE CHEMICALS

Crane Packing Co., Dept. MO-3, 6418 Oakton St., Morton Grove, Ill., announces a pipe joint sealer in tape form, made from Teflon, that positively seals all types of threaded connections under the most difficult service

PUSH BUTTON Speed Selection from to in seconds

or to any intermediate speed, instantly

Just push a button and watch the large tachometer dial on the headstock!

It's that easy!

The work is done by a motor driven speed changer. It accelerates or slows the lathe to any desired speed in seconds. With a 10:1 ratio, this new variable drive makes it easy to select from a wide range of speeds—200 to 2000 rpm in direct drive and 40 to 300 rpm in back gear.

Maximum stability and smooth

power transmission are assured because the drive unit is oversized. All pulleys and shafts are fully supported (eight bearings). Double V-belts throughout the drive eliminate slippage and deliver full power to the spindle. Because of this rigidity and extra pulling power, this lathe will take heavy cuts at all speeds and precision finish cuts at high speeds.

It is a precision lathe, moderate in price, with the versatility for toolroom, production or second operation jobs.

SHELDON Variable Speed PRECISION LATHES



Write for
"Variable Speed"
Circular and General
Catalog showing . . .

- 10", 11", 13" and 15"
SHELDON
Precision Lathes
(Bench, Pedestal
and Cabinet types)

- 13" and 15"
SEBASTIAN
Geared Head
Lathes

- **SHELDON**
Milling
Machines

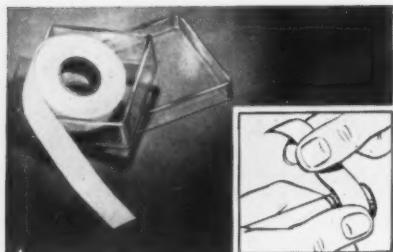
- **SHELDON**
Back Geared
Shapers

SHELDON MACHINE CO., INC.
4250 N. Knox Ave.

Chicago 41, ILL.

For more data circle 464 on Postpaid Card

new shop equipment . . .



The Crane Thred-Tape Pipe Joint Sealer

conditions. It will safely handle most industrial acids, corrosives, caustics, hydraulic fluids and aromatic fuels. It is also recommended for alkalis, toxics, biological and gas service. Temperature range is from minus 250 to plus 500 degrees F., pressures to thousands of pounds.

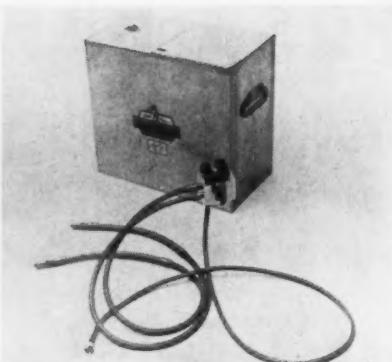
Known as Thred-Tape, it can be used on plastic, aluminum, stainless steel, ceramic, synthetic rubber and carbon pipe. It prevents seizing and galling, is self-lubricating and allows connections to be drawn up to a greater degree of tightness. It never hardens, thus permitting easy disassembly of joints even after years of service.

The new sealer is available in $\frac{1}{2}$ by 288 inch rolls and is easily applied by wrapping tightly around the male threads. When the connection is made, the tape fills in the voids to provide a leakproof seal. Simple instructions include manufacturer's recommended tape lengths for all standard sizes. A rigid, clear plastic box protects the tape and provides a convenient package for handy shelf or tool kit storage. **For more data circle 88 on Postpaid Card**

★ modern machine shop ★

MIST COOLANT SYSTEM

Lloyd Tool Corp., 3330 East Colorado, Pasadena, Calif., announces the



The Lloyd Kool-Mist Coolant System

Kool-Mist Mist Coolant System. It can be siphoned from any coolant container now in use in the plant; one to 100 Kool-Mist Units can be siphoned from a single large container; the Kool-Mist nozzle can be screw adjusted for a fine, pin point mist or a coarse wide mist; the units can be attached to machine tools either with a clamp or a permanent magnetic holder; Kool-Mist can be operated from the front or from any position on machines—or on container—simply drop siphoning line in any container and connect to the air line.

For more data circle 89 on Postpaid Card

★ modern machine shop ★

SWIVEL SCREW CLAMPS HOLD PARTS WITHOUT MARRING

Carr Lane Mfg. Co., 4200 Krause Court, St. Louis 19, Mo., announces swivel screw clamps and swivel head screws that are made up of a threaded body and replaceable shoes that thread onto a threaded ball end of the body. A 40 degree swivel permits the shoe to angle to the contour of the part that is being held. The shoes will rotate without unthreading from the body. The threaded ball on the body allows removal of shoe or swivel foot



MARK OF
QUALITY

STANDARD STEEL SPECIALTIES

• MACHINE KEYS

We can supply a complete line of finished machine keys, including gib head and taper keys, rod keys, round end keys, etc.

• WOODRUFF KEYS

Complete stock of standard keys on hand for prompt shipment. Made from open hearth or alloy steel.

• TAPER PINS

Available in sizes 7/0 through 10 and lengths from $\frac{3}{4}$ inch to 6 inches. Others made to specifications.

• MACHINE RACK

Can furnish rack from almost any size blank and pitch as well as length to form continuous sections.

WRITE FOR CATALOG

STANDARD STEEL SPECIALTY CO.

BEAVER FALLS

PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 465 on Postpaid Card

Troubled by Withdrawal Marks?

the new RELIEVOMATIC* saves you costly refinishing!

No more rejects or refinishing because of marred surfaces made by cutting tools on their return pass! Now—the RELIEVOMATIC renders precise parts with perfectly smooth surfaces. For boring, turning or facing on automatic metal turning equipment.

Write for complete technical literature.



normal marred surface

* U. S. Patent No. 2,712,767



perfectly clear surface

with RELIEVOMATIC!

SILBER PRODUCTS, INC.

870 ESSEX STREET • BROOKLYN 8, N. Y.

Nightingale 9-8600

For more data circle 466 on Postpaid Card



'YOU CAN
BE SURE OF

with

Perfect Alignment

ROOFE Heavy Duty Bull Nose Centers

Two double rows of quality bearings in the large and small ends of the nose of this Heavy Duty Bull Nose Center make perfect alignment positive on any type of work.

Two shank sizes provide diameters from $\frac{1}{2}$ " to $7\frac{1}{2}$ " for a wide range of work with a single center. Write now for complete catalog.

HOUSTON GRINDING & MFG. CO., Inc.

P. O. BOX 7461 • HOUSTON 8, TEXAS

For more data circle 467 on Postpaid Card

new shop equipment . . .



Swivel screw clamps will not mar parts

for interchangeability of two types of shoes. It also permits assembly of the screw body into the fixture pad without damage to the temper of the ball.

Swivel screw clamps feature hex socket drives and swivel head screws have large knurled head drives for use when finger torque is sufficient. All parts are heat treated and rustproof. Body threads are national coarse from $\frac{1}{4}$ -20 to $\frac{5}{8}$ -11.

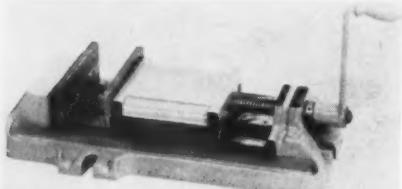
For more data circle 90 on Postpaid Card

★ modern machine shop ★

MILLING MACHINE VISES

E. R. Dugas Machine Works, 620 Yuma Court, Dallas, Texas, announces two new heavy duty milling machine vises, the Models 66 and 86.

These heavy duty units feature: (1) made from long wearing, oil resistant Meehanite casting; (2) saves money



Dugas Model 66 Milling Machine Vise

by eliminating excess breakage; (3) replaceable bronze nut; (4) coolant trough all around for clean operation; (5) one year guarantee against breakage; (6) low center of gravity for extra rigidity; (7) compact and rigid construction; (8) ground base; (9) finish machined off keyways for greater accuracy; (10) key slots in both directions to permit accurate location in either position on table.

For more data circle 91 on Postpaid Card

★ modern machine shop ★

ORBITAL ELECTRIC SANDER

An orbital electric sander, the Model EO 900, is announced by Sundstrand Machine Tool Division, Sundstrand Corp., 2539 Eleventh St., Rockford, Ill. It is a high-output unit for continuous one or two hand operation on single phase, 115 volt a.c. on a wide range of industrial applications.

The key to the successful operation of the sander is the unique design of the single phase motor that insures constant operating speed without requiring belt or gears, provides high starting torque and is overload-proof. Its simple and extremely sturdy design requires no centrifugal switch. Because there is no commutator or brushes, this potential trouble spot is completely eliminated.

For more data circle 92 on Postpaid Card



Model EO 900 Orbital Electric Sander



For more data circle 468 on Postpaid Card

**Here's
the
dope!**



PREIS-PANTO SINGLE-LIP ENGRAVING cutters



STRAIGHT
AND TAPERED
SHANK CUTTERS
IN H.S. STEEL
TUNGSTEN CARBIDE
DIAMOND TIPPED
AND DIAMOND DRAG
MARKING



CUTTER GRINDER
for sharpening your
engraving cutters



H. P. PREIS ENGRAVING MACHINE CO.

687 U.S. ROUTE 22, MILLSIDE, NEW JERSEY

For more data circle 469 on Postpaid Card

are now
available in
improved design
at new low prices.
All single lip cut-
ters are furnished un-
sharpened or sharpened
to any shape or angle
required.

Unsharpened cutters stocked for
quick delivery

See Preis first for complete line
of quality engraving machines
and accessories

Write for complete details and prices.
For immediate attention write directly to manufacturer below.
Ask for nearest representative.

Bay

Specify BAY, the finest value in steel equipment, and be sure of receiving products which are designed properly—produced properly—unconditionally guaranteed. And you will receive them quickly!

OUR RECORD: Over 15 years satisfied use by leading national companies.

THE REASON: Our equipment is its own best salesman.

BAY PRODUCTS DIV.

AMERICAN METAL WORKS, INC.
BALDWIN 9-1805
1825 W. CAMBRIA ST., PHILA. 32, PA.

For more data circle 470 on Postpaid Card

PRODUCTS

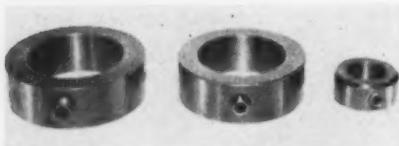
Write now for Free Catalog,
Complete Pricing Information,
and the name of your local
Bay Distributor.



WORK BENCHES
STEEL SHELVING
HANDICABINET®
BENCHES
STOCK CARTS

SERVICE TRUCKS
STACKING BOXES
PARTS BINS
SMALL PARTS
CABINETS AND
CASES

new shop equipment . . .



The Jergens line of steel shaft collars

STEEL SHAFT COLLARS FEATURE NEW DESIGN SET SCREW

A complete line of steel shaft collars, introduced by Jergens Tool Specialty Co., 712 East 163rd St., Cleveland 10, Ohio, uses a special socket set screw, tested and proven to give unusual holding power.

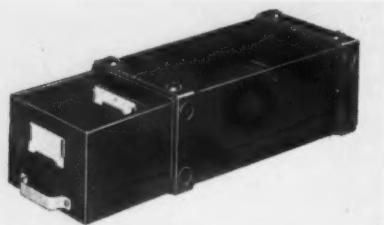
These shaft collars are available in sizes to fit all shafts, ranging from $\frac{1}{4}$ to 3 inch o.d. in $1/16$ inch graduations, to meet close tolerance requirements of manufacturers. Made of black penetrate finish steel, the Jergens Shaft Collars serve a wide range of needs in all phases of industry.

For more data circle 93 on Postpaid Card

★ modern machine shop ★

SECTIONAL CLIP-TOGETHER SMALL PARTS DRAWERS

Hake Products, Inc., 6152 Wasigo Dr., Cincinnati 30, Ohio, is offering three sizes of sectional steel drawer cabinets for storage of small parts,



Hake Clip-Together Small Parts Drawers

tools and so on. Unique feature of these "Sods" is the spring steel buttons on top, sides and bottom which snap together with duplicate units and hold tight to form various combinations of sizes, yet can be easily pried apart for rearrangement. Medium and large size Sods fit side by side between uprights of standard steel shelving.

The drawers are subdivided on $\frac{1}{2}$ inch centers. Dividers lock into position, preventing the smallest part from getting around or under them. Drawers slide easily on line contact, even under heavy loads. Positive stops prevent spilling of contents.

Sods are built together as bought; only units actually needed are ordered. When more storage is required, additional Sods can be snapped to the original cabinet grouping.

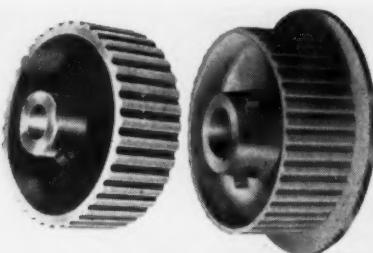
For more data circle 94 on Postpaid Card

★ modern machine shop ★

CORRUGATED, CROWN FACED PULLEYS

Corrugated, crown faced pulleys are now offered by Robert A. Main and Sons, Inc., Box 86M, Paramus, N. J., in sizes from 3 to 12 inches in diameter. These pulleys, which are used for flat belt drives, can be supplied with or without a flange. The corrugated surface of these cast pulleys assures a positive drive. They are made of tough, cast material for long life.

For more data circle 95 on Postpaid Card



R. A. Main Corrugated, Crown Faced Pulleys

For more data circle 471 on Postpaid Card

Air-O-chek

The Nozzle Valve with the internal fulcrum lever

Available in two models and many sizes



AIR ECONOMY

SAVE through superior performance, low maintenance, low initial cost. Air-O-chek air guns are of simple design, sturdy construction, and are easy to use.

Write for details

AIR-WAY PUMP & EQUIPMENT CO.
1046 N. Kilbourn Ave., Chicago 31, Ill.

For more data circle 472 on Postpaid Card

KUTMORE ADJUSTABLE HOLLOW MILLS



A MIGHTY MIDGET!

This Midget Floating Holder Hollow Mill, flange type, has micrometric adjustment, and is designed to permit easy compensation for any spindle misalignment. Small, sturdy, extremely accurate!

WRITE FOR CATALOG 20MM

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.

CARL WIRTH & SON, INC.

1625 CLINTON AVE. NO. ROCHESTER 5 NY

For more data circle 473 on Postpaid Card

July, 1959

modern machine shop 201

new shop equipment . . .



Toolholder for screw-on Kenedex Inserts

HOLDERS FOR SCREW-ON INSERTS

Holders designed for the precision screw-on type Kenedex Inserts are now stocked by Kennametal, Inc., Latrobe, Pennsylvania.

Typical applications of these screw-on inserts are small boring bars and automatic tooling for small parts on which the design or size of the standard clamped type Kenedex tools limits their use.

Presently stocked toolholders include four right and left hand sizes for square, triangular and round inserts. Five grades of inserts are stocked.

For more data circle 96 on Postpaid Card

★ modern machine shop ★

CARBIDE WOODRUFF KEYSEAT CUTTERS

As an added service to its customers, Quality Tool Works, 792 South Market, Waukegan, Ill., has available from stock a complete line of Carbide Wood-

ruff Keyseat Cutters in the more popular sizes, from $\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter.

These cutters have hardened high speed steel bodies to provide adequate support for the carbide tips. Especially useful on material that is difficult to machine, Quality Carbide Keyseat Cutters permit a faster cutting cycle and longer runs.

These cutters have been production proved on high alloy materials, heat treated shafts, shafts with hard spots and carburized shafts.

For more data circle 97 on Postpaid Card

★ modern machine shop ★

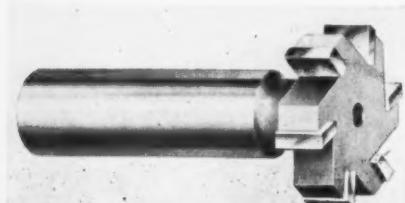
POLISHING BRUSHES DESIGNED FOR USE WITH DIAMOND COMPOUNDS

For all final polishing operations on dies, molds and gages, a line of brushes has been developed by Hyprez Division, Engis Equipment Co., 431 South Dearborn St., Chicago 5, Illinois.

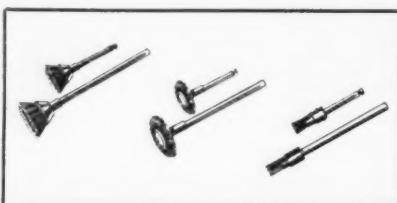
These brushes are made of finest natural stiff bristle for economical and effective final finishing with diamond compounds, and are available in three shapes: end, wheel, cup.

Perfectly centered shanks of two lengths permit the use of Hyprez Brushes with either the straight or contra-angle handpieces of the Di-Profiler Reciprocating Hand Machine, or they may be used with equal efficiency with any type of rotary hand tool.

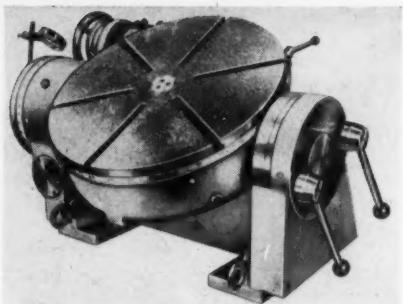
For more data circle 98 on Postpaid Card



Quality Carbide Woodruff Keyseat Cutter



The Hyprez Line of Polishing Brushes



Imperial Precision Inclinable Table

PRECISION INCLINABLE TABLES

A full line of Imperial High Precision Inclinable Tables is being offered by Opto-Metric Tools, Inc., 137MM Varick St., New York 13, New York.

These tables are available in six sizes, which range from 10 to 32 inches in diameter. Because of their extreme

precision, they are equally well suited for jig boring, assembly and inspection operations. They read in 1 or 2 seconds respectively and a circumferential correction cam vouches for an indexing accuracy of 10 seconds of arc. A certificate of proof in 5 degree intervals is furnished with each table as part of the standard equipment.

For more data circle 99 on Postpaid Card

★ modern machine shop ★

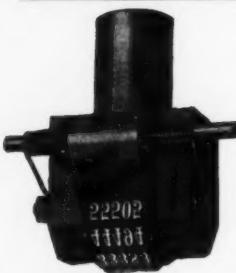
TAPE CONTROLLED POSITIONING TABLE

The American Tool Works Co., Cincinnati 2, Ohio, announces a tape controlled positioning table, which can work in millionths of an inch — a degree of accuracy previously possible only with the finest jig borers.

The machine will position, drill and ream to accuracies on the order of 50 millionths of an inch, less than one thousandth of the thickness of a

NUMBERALL

CUTS THE COST OF STAMPING NUMBERS



MODEL 50 Automatic
Numbering Head. Write
for catalog MS-50.

numbering heads, non-automatic, with quick-set wheels.
Write for catalogs MS-80, MS-83 and MS-85.

Steel Type and Wheels Available with Round Face Characters.

NEW MODEL 70

MULTI-WHEEL NUMBERING MACHINE

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20. Can be furnished in 1/32" to 3/8" high figures, sharp face gothic or shaded roman style. Write for Bulletin MS-70. We also make other

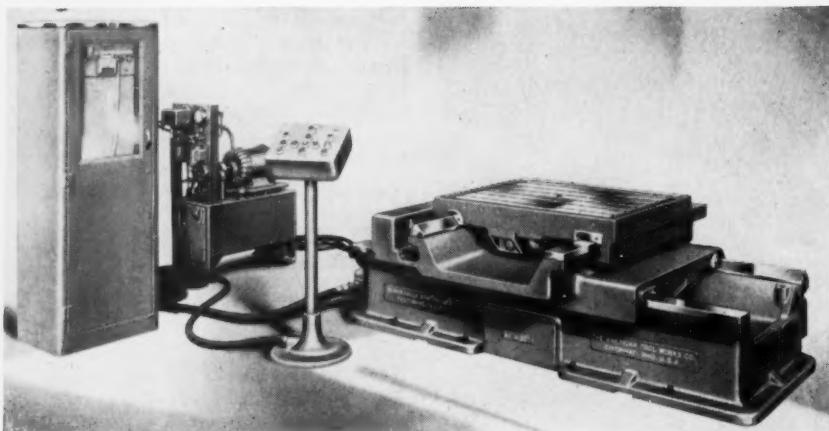


Hand shank Model 70 illustrated. Press shank for foot or power presses also available.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

For more data circle 474 on Postpaid Card

new shop equipment . . .



Tape controlled positioning table on base of American Hole Wizard Radial Drill

human hair. Numerically controlled by a punched tape housed in a sealed, pressurized cabinet, the 8,000 pound positioning table, coupled with the Hole Wizard radial drill, can perform a number of machining operations at savings in time and tooling costs.

The new machine makes available a production type unit, which can be installed in the shop, yet can handle with extreme accuracy and greater speed many intricate boring, drilling, reaming and similar operations previously performed on lower powered machines of correspondingly smaller capacity.

For more data circle 100 on Postpaid Card

★ modern machine shop ★

**BOTTOMING BAR FEATURES
FLOATING CUTTER**

A bottoming bar, introduced by Robert H. Clark Co., P.O. Box 990, Beverly Hills, Calif., is designed for finishing both walls and bottoms of holes to close tolerances with excellent

finishes. The bar is not designed for full bottoming since, in expanded position, a small gap exists between the two cutter blades. It will, however, square off internal shoulders, cleaning up bottoms to within a small dimension of the center, depending upon bar size.

A floating mount is employed in the bar which permits lateral movement of the cutters. Chip load is thus equalized on each cutting lip and the blades center themselves to the bore, resulting in extremely fine finish and exact bore diameter.

Clark Bottoming Bars are supplied in a standard range of sizes covering holes from 1 to 5 inches i.d. Other sizes will be furnished on special order.

For more data circle 101 on Postpaid Card



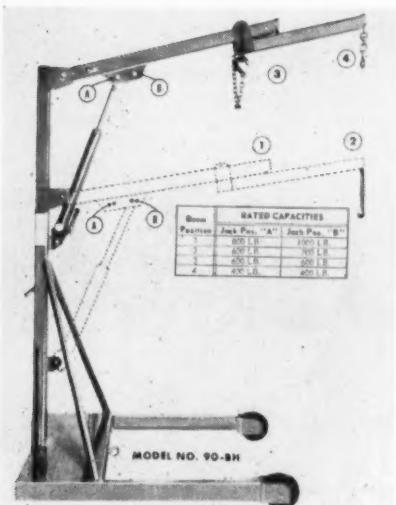
Bottoming bar features floating cutter

PORTABLE, SIMPLIFIED HYDRO-LIFT CRANE

A portable hydro-lift crane, designed for ease of castings, motors, assemblies and other heavy equipment in shops is introduced by Star Machine and Tool Co., Minneapolis 14, Minn. Named "Little Oscar," the new product is designed along the simplest possible lines in order to supplant costly and cumbersome overhead tracks lifting equipment.

"Little Oscar" is constructed with a full half-ton capacity and a lifting range from 16 inches to more than 10 feet and is mounted on two roller bearing, load-carrying rubber wheels and two rubber swivel casters for easy steering. The firm also offers an additional truck-mounted model.

With streamlined efficiency in mind, it measures only 33 inches in width and the crane boasts a two-position boom and a lift speed of 10 f.p.m. A principal feature is the heavy duty safety release valve that assures safe, easy control of the load when lower-



Star Portable Simplified Hydro-Lift Crane

July, 1959

Enco Turrets Assure ±.0005" Accuracy



by
being
on the
ball!

Enco's passion for exacting accuracy is paying off in metal working operations everywhere! Combining precision lathe output with efficiency and economy has become a necessity . . . and Enco turrets have proved the ideal answer. An Enco turret transforms one lathe into a production machine, each operation of unsurpassed accuracy due to *spring loaded ball design*!



Spring loaded balls give you the accuracy you want! Hardened steel precision balls locked between accurately milled spherical seats consistently give accuracy in re-indexing. Hardened all steel construction minimizes wear, retains built in precision.

Also Mfrs. of Enco Hexturret Bed Turrets

Write today for catalog No. 53.

There's an ENCO turret for every lathe.

Enco MANUFACTURING CO.

4520 West Fullerton Avenue
Chicago 39, Illinois

Dept. 179

For more data circle 475 on Postpaid Card

modern machine shop 205

new shop equipment . . .

ing, especially in shops requiring handling of heavy car and truck motors. The Model 90-BH is said to be particularly adaptable for this type of function.

For more data circle 102 on Postpaid Card

★ modern machine shop ★

MEMORY SYSTEM DEVELOPED FOR NUMERICAL CONTROL

The Fosdick Machine Tool Co., Cincinnati 23, Ohio, has developed an electromechanical unit that works with tape control reader to anticipate machine actions and speed machining operations.

The most striking feature of this cross-bar switch is a grating of crossed bars, actuated by electromagnets. The bars in the X axis feed information into the switch. The bars in the Y axis pick it up, hold it and release it when needed. Each cross-bar switch contains 10 columns of 10 contacts. In effect the switch has 100 "pockets"—ten repre-

senting the numeral "1," ten representing "2," and so on—in which digital information can be stored.

It takes only two cross-bar switches to store all the information needed to control spindle feeds and speeds, and two axes of table movement. A third can handle spindle depth control and tool designations; a fourth automatic tool changing. Five switches are easily housed in the standard control and tape reader console furnished with Fosdick Numerically Controlled Jig Borers.

For more data circle 103 on Postpaid Card

★ modern machine shop ★

POWER BAND SAW

Covel Mfg. Co., Benton Harbor, Mich., announces the Excel 3 by 6 Inch Power Metal Cutting Band Saw.

Incorporated in the design of this saw are the following features: adjustable hydraulic cutting feed control for infinitely variable blade feeds; automatic shut-off switch stops motor upon completion of cut; weighing only 95 pounds, it can be easily moved to the job; adjustable vise permits angular settings up to 45 degrees; half-nut for clamping screw facilitates quick adjustment of vise jaws.

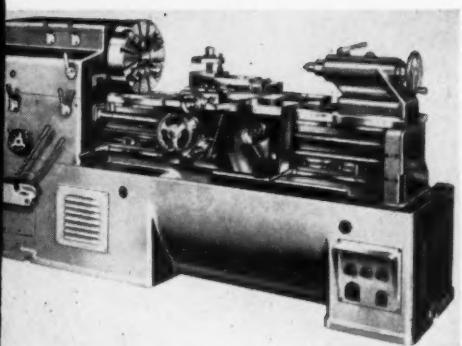
For more data circle 104 on Postpaid Card



Tape control console for boring machine



Excel 3 by 6 Inch Band Sawing Machine



Model B Imperial Heavy Duty Lathe

HEAVY DUTY LATHES

Aaron Machinery Co., Inc., Dept. M, 45 Crosby St., New York 12, N. Y.

announces the Imperial B Lathes. This series of machines features modern design, elevated output and very high precision with chip pan cast in a single piece with two legs.

Standard accessories: coolant equipment (without electro-pump); electrical equipment (without motor); two No. 5 Morse taper centers; reduction bushing; set of spanners and one use and maintenance book.

For more data circle 105 on Postpaid Card

★ modern machine shop ★

IMPROVED 20 TON BENDING PRESS

For bending tubing, pipe and certain rolled or extruded shapes, Pines Eng. Co., Inc., 642 Walnut, Aurora, Ill., announces a new, improved 20 ton

com pare

- SPEED
- ACCURACY • QUALITY
- PRICE

You will know the best buy is . . .

BACKUS ABRASIVE WHEEL CUT-OFF MACHINES

For Ferrous Metals

Precision-built Backus Abrasive Wheel Cut-Off Machines have won acceptance in scores of plants and shops throughout the country. Bars, shapes and tubing of steel and alloys are cut quickly and accurately at any angle. Operates with 12 inch abrasive wheel.



Write Today For More
Information And Price!

BACKUS MACHINE WORKS

ROUTE 17, CARLSTADT, N. J.

May Be Used For
Non-Ferrous Metals
With Simple Con-
version Unit!

SINCE 1914

For more data circle 476 on Postpaid Card

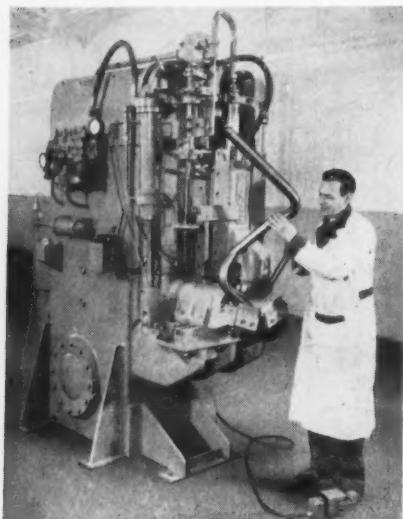
new shop equipment . . .

bending press. For high speed, progressive bending of workpieces requiring different angles and different bend planes, this bending press is said to provide long, dependable service on work up to maximum steel tube sizes of 2 inches outside diameter by 0.083 inch wall.

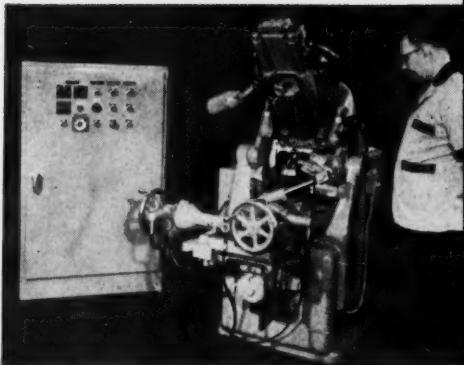
Major improvements now incorporated into the press include an offset bending ram, a ram cylinder deceleration circuit that assures greater bending accuracy, internally drained hydraulic cylinders that prevent oil leakage around piston rods, and a heavy, cast-steel C-type frame that minimizes die deflection. The new design provides more working clearance for handling various odd-shaped workpieces.

Net weight of the press is 9,100 pounds. Floor space requirement is 5 by 8 by 8 feet high.

For more data circle 106 on Postpaid Card



Pines Model 1900 Improved Bending Press



Ingersoll Semi-Automatic Cutter Grinder

CUTTER GRINDER IS SEMI-AUTOMATIC

As a companion to its automatic cutter grinder, The Ingersoll Milling Machine Co., 505 Fulton Ave., Rockford, Ill., is offering a semi-automatic cutter grinder. It may be obtained either as a complete new unit, or by having power control parts added to manually actuated Ingersoll cutter grinders, built in recent years.

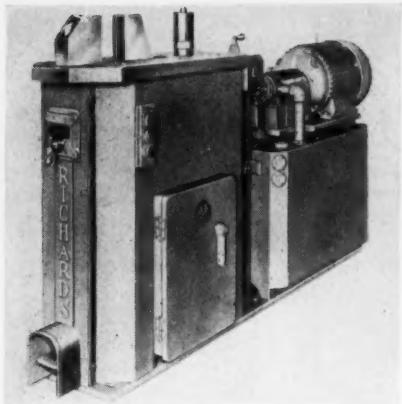
The semi-automatic grinder reduces labor costs and provides better grinds. It adds the advantages of power-controlled grinding to advantages already inherent in the design of the 30 inch Ingersoll General Purpose Grinder.

For more data circle 107 on Postpaid Card

★ modern machine shop ★

HYDRAULIC BENDERS FOR STOCK UP TO 1/2 BY 8 INCHES USING STANDARD TOOLING SYSTEM

The J. A. Richards Co., Dept. 6-M, Kalamazoo, Mich., announces production of two new models in its "Multi-form" line of hydraulic bending machines. The newest of the "Multi-form" series are the Model BB-H (illustrated) and the Model BB-C, a heavy duty machine of larger capacity. The BB-H



Richards Multiform Hydraulic Bender

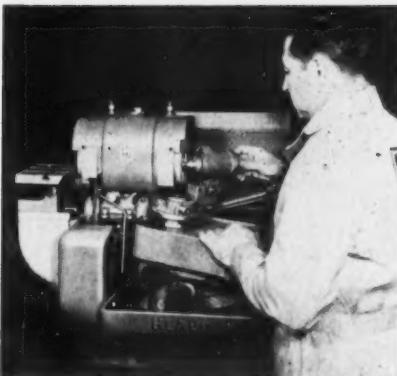
is capable of handling a wide range of bends on stock up to $\frac{3}{8}$ by 6 inches, while the BB-C will bend $\frac{1}{2}$ by 8 inch copper. Both models are completely self-contained. The BB-H is equipped with a 10 h.p. motor, while the BB-C carries 15 h.p. Both models feature a constant-power hydraulic system. This power, through a toggle action advantage, provides a constant source of power, regardless of the thickness of the material being formed. Model BB-H is capable of speeds from inching through 21 s.p.m., while the BB-C operates on a complete cycle of only 4 seconds.

For more data circle 108 on Postpaid Card

★ modern machine shop ★

TOOL SHARPENING MACHINE IS AVAILABLE IN TWO DESIGNS

A sharpening machine for metal cutting tools is available from The Heald Machine Co., Worcester 6, Mass., in two designs, Model 3 for conventional elliptical-tip tool grinding and Model 4 which can handle either elliptical or true radius tip grinding. Both provide an economical,



View of Heald Tool Sharpening Machine

high precision means of grinding carbide tipped and high speed steel cutting tools. Fully automatic reciprocation assures uniform and repetitive tool tip accuracy and permits one operator to tend several machines at the same time. An offhand grinding

Chuck and Stub REAMERS IN DECIMAL SIZES Why Buy Specials?

**Thousands by
the thousandths
IN STOCK**

**IN EMERGENCY
Telephone
Libertyville
2-4200**

SEND FOR CATALOG NOW!

**TWENTIETH CENTURY
MANUFACTURING CO.
BOX 429-M LIBERTYVILLE, ILL.**

For more data circle 477 on Postpaid Card

modern machine shop 209

new shop equipment . . .

attachment at the left end of the machine is standard equipment.

The Model 4 Tool Sharpening Machine's provision for true radius grinding provides greater accuracy where the tool is used in machining contoured shapes, in which contact varies about the tool tip with the configuration of the workpiece. In true radius grinding on the Model 4, the clearance angle is obtained by setting the axis of toolholder oscillation at the desired angle, thus generating a conical surface. As a result, in contour boring or turning, the clearance angle and the tool tip radius remain constant, although the cutting point moves about the tool tip. A toolholder for conventional elliptical tip sharpening is supplied with each Model 4 machine.

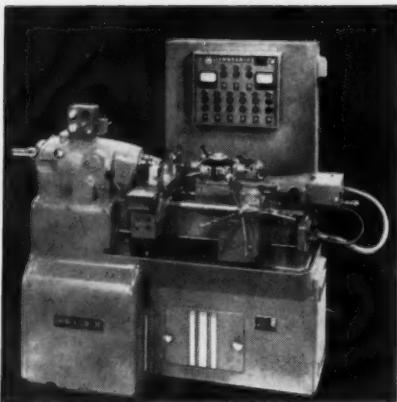
For more data circle 109 on Postpaid Card

★ modern machine shop ★

IMPROVED HAND SCREW MACHINE

Higher output and greater accuracy with less operator effort are the performance characteristics of the Speedi-Matic, an improved hand screw machine, available from The Monarch Machine Tool Co., Sidney, Ohio. Recommended for lots ranging from less than 25 to more than 2,500 pieces, it features simplified electronic controls and hydraulically powered turret.

The control center provides preselected, automatic speed and feed change. A separate speed may be preset for each of the six turret positions (including a reverse speed for tap withdrawal) and for each of the two cut-off and forming slide positions. Speed range is infinitely variable from 40 to 4,000 r.p.m.; feed range, infinitely variable from $\frac{1}{8}$ to 16 i.p.m. It is possible, consequently, to use the most



Monarch Speedi-Matic Hand Screw Machine

efficient speed and feed for each operation, this resulting in maximum production.

Also included in the control center are a feed indicator, a dual r.p.m. and s.f.p.m. indicator and a work diameter selector. The indicators enable the operator to quickly select the correct speed and feed for each work station. Use of the work diameter selector provides the ideal surface cutting speed without the usual calculations.

For more data circle 110 on Postpaid Card

★ modern machine shop ★

VERTICAL OPEN GAP MACHINE

Cleveland Punch and Shear Works Co., East 40th and St. Clair Ave., Cleveland 14, Ohio, announces the Type EF Vertical Open Gap Machine that is designed for greater safety and precise operating control. It features a solenoid-operated clutch and completely guarded gears and flywheel. This machine can be used in fabricating heavy steel plate and structural I-beams and girders. In addition to its punching attachment, it can be equipped for flue hole punching, notching and coping, as well as shearing angles,

plates and bars. Its solenoid-operated clutch automatically stops the machine at the end of each operating cycle, eliminating the danger and scrap resulting from a machine that depends upon the operator to keep cycle from repeating. The solenoid operation on this particular machine is so designed that each cycle or operation requires the operator to release the pedal and then push it down again to start the new cycle. In this way, it eliminates any automatic repeating of the operation by the machine as the result of the operator keeping his foot on the pedal. This machine is also built with the conventional, automatic type of operation.

Equipped with an automatic lubrication system for smooth operation and long wear, this Cleveland EF Vertical Open Gap Machine has a punching pressure of 97½ tons with sufficient capacity to punch a 1¼ inch hole through steel 1 inch thick, enabling the operator to fabricate all standard and Bethlehem sections from 7 inch I-beams to 30 inch girders, including 14 inch columns punched in the flange and web. It is also capable of shearing ¾ inch plate and will square shear angles 4 by 4 by ½ inch. This type of

machine can be furnished with throat depths from 12 to 60 inches.

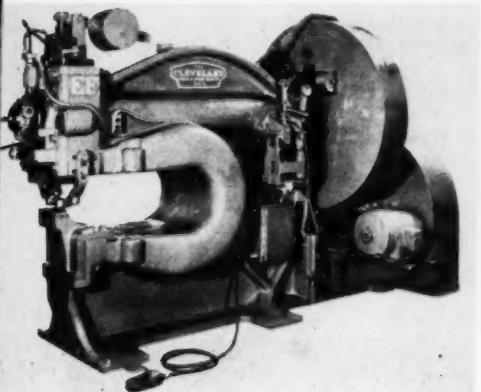
For more data circle 111 on Postpaid Card

* modern machine shop *

AIR-HYDRAULIC PUNCH PRESS

Punch Products Corp., 3814 Highland Ave., Niagara Falls, N. Y., announces an air-hydraulic Unipunch Press.

This Unipunch Press Model 1012, equipped with precision Unipunch Gauging and Unipunch Tooling, is ideal for fast, economical hole punching in angles, channels, extrusions and sheets plus notching operations. A total of 37 round punches and 74 dies with four Unipunch Hole Punching Units and one Unipunch Notching Unit are available with this press. These Unipunch Units provide rapid interchangeability of punches and dies for various hole diameters. In addition



Type EF Vertical Open Gap Machine

July, 1959

COLD EXTRUSION HOBBING!

*Here At
Last!*

Intricate Shaped
Cavities are
Produced by
Cold Extrusion to
Precision Accur-
acy . . .

Cavities that
would be totally
impractical to machine are now produced
in a single operation and in any quantity.
Technique applied to copper, aluminum and
hobbing steel.

Lower cost—closer tolerances.



Send drawings of your designs for quotation to:

ANTON MACHINE WORKS

1226 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 478 on Postpaid Card

modern machine shop 211

new shop equipment . . .



Unipunch 10 Ton Air-Hydraulic Press with Unipunch Gauging, Unipunch Hole Punching Unit, Work Light, Foot Control and Cabinet.

to punching round and shaped holes and notching corners and edges, this press may be used for punching extruded and countersunk holes, small louvers and lanced holes. Small die sets may be installed for making stampings. Threaded nut inserts also may be pressed into sheets or parts. Heeled punches and dies are available for hogging out larger diameter holes and shapes than the maximum 2 inch diameter holes provided with standard Unipunch Hole Punching Units.

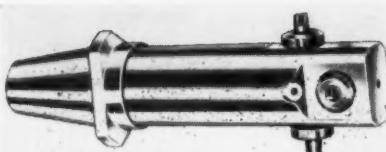
With a template, several Unipunch Hole Punching Units may be set up for making a cluster hole pattern in place of expensive custom punches and dies.

For more data circle 112 on Postpaid Card

★ modern machine shop ★

DOUBLE FEED CARTRIDGES

Portage Double-Quick, Inc., 1041 Sweitzer Ave., Akron 11, Ohio, an-



Portage Sure-Bore Double Feed Cartridge

nounces that Sure-Bore has increased the versatility of its boring bar cartridge line with the introduction of the Double-Feed Cartridge (two or more diametrically opposed Sure-Bore cartridges and tool bits, each micrometer adjustable).

This cartridge doubles boring feeds without increasing the tool load. The counter-action of the opposed pressures eliminates most of "spring" in bar and insures regularity of bore size, regardless of variations in stock removal. Chatter and out of roundness is greatly reduced. Double-Feed Cartridges can be economically inserted in existing boring bars or are available in special bars for specific requirements. The Sure-Bore Double-Feed Cartridge is easily adapted as a floating reamer. Run out of the bar, roughness in spindle bearings, reasonable variations in stock removal have no effect on size, roundness, or finish of bore with this floating reamer.

For more data circle 113 on Postpaid Card

★ modern machine shop ★

FORM RELIEF LINE OF BORING CUTTERS

Increased cutting feeds, longer tool life and finer surface finish are possible with the form relief line of boring cutters, both high speed steel and



The Maxwell Form Relieved Forged Bit

carbide tipped, recently announced by Maxwell Industries, Inc., 493 East Fifth Ave., Ashtabula, Ohio.

These cutters feature advanced spiral relief design that tends to make the chip curl and break up easily, flushing out along the shank of the tool. Especially adapted for internal work, they provide a constant clearance angle throughout the life of the tool. Extremely fine surface finish and

uniformity result from the precision chip-driver contour of the form relief design.

This line, available in a complete range of sizes for off-the-shelf delivery, will save machine shop owners considerable time and money, since fewer cutters are required to accomplish a greater range of work, thus reducing inventory.

For more data circle 114 on Postpaid Card

WILLEY'S Pentagon

UNCONDITIONALLY GUARANTEED

to out-perform any other style of carbide throw-away insert—for straight turning, boring, or facing applications—on any kind of material.



The pentagon is a cam ground, radii tangent, indexable insert of solid carbide. It presents 10 cutting edges at a 30° lead angle and each edge will produce more finished work than the edge of any other standard insert.

Not on tests alone—but in actual production; on various operations; machining all

solid carbide



indexable insert



types of materials—Willey's Pentagon more than doubled the best performance of all other inserts tried. It is proven superior . . . we guarantee it.

Try the pentagon! You'll save money. You'll do a better job—faster, and once used you'll never go back to fragile . . . high-cost . . . yesterday's tooling.

A complete catalog of Willey's carbide tool products is available on request.



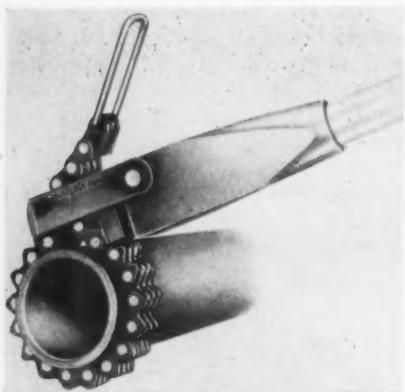
Send your part print and present tool layout for prompt quotation

WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor highway • Detroit 1, Michigan • Telephone: WOODWARD 1-9444

For more data circle 479 on Postpaid Card

new shop equipment . . .



This view shows the Memac Wrench in use

WRENCH

Mears Machine Co., 738 North Broad St., Box 231, Lancaster, Ohio, announces the Memac Wrench, which combines the smooth grip of a strap wrench and the rugged strength of a chain or pipe wrench. The encircling friction grip is said to prevent distortion and surface damage to materials or parts.

A unique feature of this wrench makes it possible to control the gripping force from a minimum to the maximum amount desired. The grip does not increase, regardless of pressure on the handle and is completely adjustable to all sizes in the wrench capacity.

Memac is recommended for working plastic, or plated pipe, thin walled tubing, hardened steel and threaded parts. Memac ratchets are designed for efficient operation in confined spaces.

Fast and easy, size and grip adjustment is by simply turning the handle. This wrench is constructed of heat treated alloy steel.

For more data circle 115 on Postpaid Card

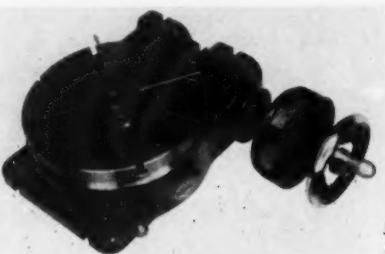
ROTARY TABLE READS TO ONE SECOND

An 11 inch rotary table, which reads to 1 second and has an overall performance accuracy of plus or minus 2 seconds throughout the entire 360 degrees, is introduced by Moore Special Tool Co., Inc., Bridgeport 7, Conn. It is called the Model No. 2 Moore Ultra-Precise Rotary Table. The company also offers a rotary table which reads to 5 seconds and has an overall accuracy of plus or minus 6 seconds.

The table was developed to meet the demand for more precise angular spacing. This is achieved through the use of a non-disengageable, thread-ground worm in combination with the accurately spaced teeth of its mating gear.

Accurate in either horizontal or vertical position, this rotary table is ideal for countless precision spacing applications on jig borers and jig grinders. An additional vernier permits normal reading, even in the vertical position.

The hand scraped steel table top runs parallel with the base within less than 0.0001 inch. The conical surface below T-slots is graduated in degrees as an easy-to-read reference scale. Fine setting is read to 1 second on chrome plated dial and vernier. Center bushing hole runs true to 0.00015 t.i.r. Further applications are possible by using the table in conjunction with its companion unit, the Model No. 2 Sine Plate, to produce compound angle



Moore No. 2 Ultra-Precise Rotary Table

settings. Maximum work height capacity on either sine plate or rotary table results from separation of these units. For more data circle 116 on Postpaid Card

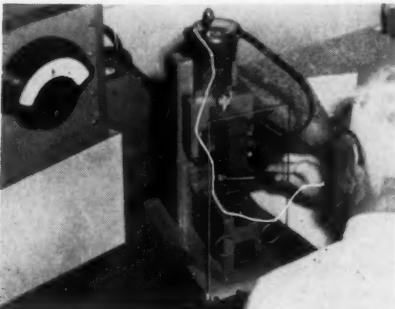
★ modern machine shop ★

HIGH ACCURACY GAGE BLOCK COMPARATOR

An electronic comparator, capable of detecting dimensional variations of one-millionth inch, is announced by Federal Products Corp., 9144 Eddy St., Providence 1, Rhode Island.

Known as the Model 130 B-12, it can accurately measure gage blocks as large as 4 inches. Its electronic amplifier provides four magnifications; namely, 2000:1, 6000:1, 20,000:1 and 60,000:1. Graduations are 0.000030, 0.000010, 0.000003 and 0.000001 inch respectively.

The precision-ground reference platen is fitted with two sets of three balls which provide an accurate three-point reference surface for comparing gage blocks. A reference surface of this type helps to maintain a constant temperature relationship between the master and the workpiece. Parts are positioned quickly, and better handling techniques, such as using heat insulated tweezers, can be used. The balls are spaced in one set to accommodate square blocks and the other



Model 130 B-12 Gage Block Comparator

July, 1959

set takes rectangular. Another type of anvil, one side serrated, the other plain and lapped flat, may be substituted for comparing parts other than gage blocks.

For more data circle 117 on Postpaid Card

★ modern machine shop ★

PORTABLE AIR POWERED ROUTER

A partial or complete cut can be made through metals, plastics, woods

HOLES

ECONOMICAL
FAST DRILLING
IN DEEP HOLES

Clark SPADE DRILL

P. O. BOX 990 BEVERLY HILLS, CALIF.

For more data circle 480 on Postpaid Card

For Small Precision Work
You Need The . . .

LINLEY JIG BORER



The Linley will meet the most exacting requirements and save you money by releasing your larger borers for heavier jobs. It's a precision tool . . . Versatile and flexible; easy to set up and fast operating. Write to receive complete information on the many improvements that are now standard.

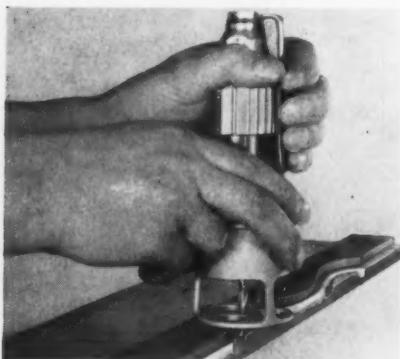
Table Size: 7" x 17 1/2"
Table Travel: 6 1/2" x 10"

LINLEY BROTHERS CO.
661 State St. Ext., Bridgeport 1, Conn.

For more data circle 481 on Postpaid Card

modern machine shop 215

new shop equipment . . .



Buckeye Portable, Air Powered Router

or even honeycomb materials, using the air powered router developed by Buckeye Tools Corp., 5013 Springboro Pike, Dayton, Ohio. Vibration-proof, positive-locking depth adjustment, oversize front end bearings and full length, full grip collet are tool features that insure exceptional accuracy in cutting, even when following the most intricate contours.

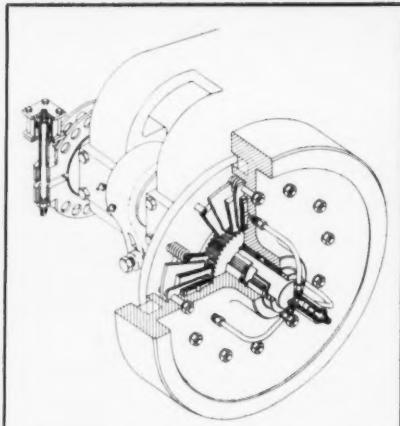
Open construction of router base provides clear view of cutting operation. Air exhaust is directed downward across the router bit to expedite chip removal. Complete tool weighs only 3 pounds, measures 7 $\frac{1}{8}$ inches in length and has a rated capacity of $\frac{1}{4}$ inch collet.

For more data circle 118 on Postpaid Card

★ modern machine shop ★

AIR CLUTCH AND BRAKE

Service Machine Co., 2310 West 78th St., Chicago 20, Ill., announces air clutch and brake units that are fast acting, smooth operating and very economical. Both the friction clutch and the brake are air operated and electrically controlled, allowing press



Line drawing of air clutch and brake

speeds to be increased without fear of damage or shortened life to the clutch.

Shockless, instant starting and stopping are obtained with extremely low air consumption and are due to closely machined air passages, a flexible, ring type seal that moves only slightly and the fact that almost all clutch weight rotates constantly with flywheel to minimize inertia. Clutch compensates for wear automatically, needs no adjustment and is practically maintenance free.

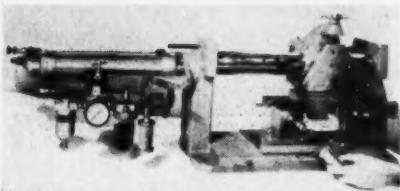
New Rousselle presses of 15 tons or more can be furnished with these efficient units.

For more data circle 119 on Postpaid Card

★ modern machine shop ★

ROTARY MARKING MACHINE

A rotary marking machine with a 14 inch stroke, air operated from standard 75 p.s.i. or greater plant air line, for marking parts, products and material at a speed of 1,500 or more marked parts per hour, is offered by The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. Designated as Model



Acromark 9A-14 Rotary Marking Machine

No. 9A-14, this machine utilizes flat dies engraved with raised lettering or design to mark rings, hand-wheels, dials, rods and other products, to high precision including calibrations and graduations.

Operated by a hydraulic speed control mechanism with air-exhaust muffler for quiet operation, this machine represents an advance in precision, quiet operation, safety and production efficiency. It has a fog type lubricator and controls may be hand, foot or electrical.

For more data circle 120 on Postpaid Card

★ m m s ★

COIL HANDLERS

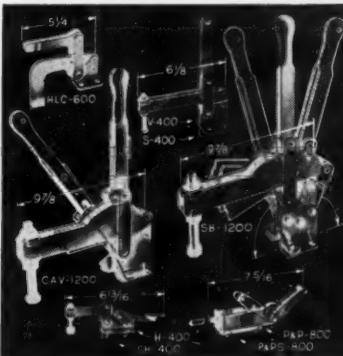
Benchmaster Mfg. Co., 1835 West Rosecrans Ave., Gardena, Calif., announces new design features in its

Heavy Duty Koil Kradles. These add greater operating convenience, increase strength and rigidity of frame and improve efficiency. With its redesign, improved width capacity has been obtained between guide plates, yet overall outside dimensions have been reduced. Side plates are joined in a rigid, welded structure, employing heavy wall tubes as transverse members. The tubular construction eliminates racking and torsional deflection of the frame, consequently retains

THERE ARE KNU-VISE PRODUCTS TO MEET YOUR EVERY CLAMPING NEED (OVER 150 MODELS)

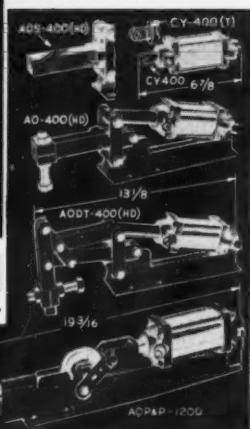
LAPEER devices are the choice of leading manufacturers for all operations requiring fast and reliable clamping.

Recognized as clamping engineers we can give you much valuable assistance. We will gladly discuss your clamping problem at your plant.



UNMATCHED FOR RUGGED USE, DEPENDABILITY, SPEED AND LONG SERVICE

They were developed through exhaustive tests in laboratory and years of practical use.



LAPEER MANUFACTURING CO.

3048 DAVISON ROAD, LAPEER, MICH.

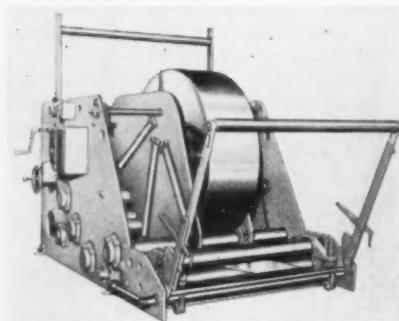
Manufacturers of over 150 models of manually and air-operated clamps and pliers.

WESTERN DIV.: PECK and LEWIS CORP.
4436 Long Beach Ave., Los Angeles 58, Calif.

CANADIAN DIV.: HIGGINSON EQUIP.
SALES, 1131 Pettit Road, Burlington, Ontario

For more data circle 482 on Postpaid Card

new shop equipment . . .



Benchmaster Heavy Duty Koil Kradle

alignment of bearings in which rolls are mounted and is much more rigid.

Pinch rolls are furnished as standard equipment in the 700 Series Koil Kradles. This series is available in a range of coil weights up to 20,000 pounds with coil widths to 50 inches. For more data circle 121 on Postpaid Card

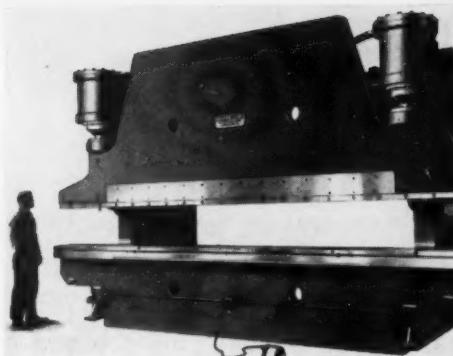
★ modern machine shop ★

GIANT HYDRAULIC PRESS BRAKE

The longest machine built in the expanding line of Steelweld Hydraulic Press Brakes has been completed by The Cleveland Crane & Eng. Co., 6458 East 282nd St., Wickliffe, Ohio. The machine, Model LH14-14, will accommodate mild steel plate up to 20 feet by 5/16 inch.

A feature of importance in many shops is that the machine cannot be damaged by overloading. This is true regardless of size plate put into the press. Because of the hydraulic design, the ram will simply stop without harm to the machine. It can be backed away immediately.

The machine illustrated is rated at 500 tons, but other Steelweld Hydraulic Press Brakes are available in capac-



Steelweld 500 Ton Hydraulic Press Brake

ties from 200 to 2,000 tons, and for plate lengths to 30 feet.

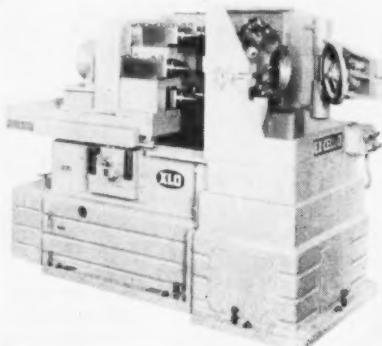
For more data circle 122 on Postpaid Card

★ modern machine shop ★

STANDARD UNITS MAKE LOW COST MACHINE

Ex-Cell-O Corp., Detroit 32, Mich., states that a one-way precision boring machine can be built up almost entirely from standard Ex-Cell-O machine components.

A standard way unit is employed to support six standard precision spindles mounted on a standard slide. The way



Ex-Cell-O One Way Boring Machine

unit is bolted to a standard end section, on which is located the work holding fixture.

This method of construction insures low initial cost plus the added advantage of versatility—units may be easily rearranged to suit product changes. For more data circle 123 on Postpaid Card

★ modern machine shop ★

PUNCHING UNIT

A Strippit press actuated hole punching unit may be quickly altered from 0.250 to 0.750 capacity in mild steel by changing stripping mechanisms, according to Wales - Strippit, Inc., 207 South Buell Rd., Akron, N. Y. Consisting of a single heavy duty holder for both capacity ranges, the unit has a readily removable punch assembly and two lift-out stripping springs. With mechanical springs in place, the unit has stripping pressure suitable for the lower capacity work and, by replacing these with Hydra-Springs, stripping pressure is greatly increased for

heavier work. The conversion requires only a few seconds and the user has, in effect, an extra punching unit for the cost of the Hydra-Springs alone. For more data circle 124 on Postpaid Card

★ modern machine shop ★

SPECIAL ABRASIVE CUT-OFF MACHINES

Abrasive cut-off machines are now furnished to suit the particular oper-

STANDARD HEAVY DUTY SUPER PRECISION **SPINDLES**

"Masters of Milling"

No. 6027 MY

No. 5009 M

AMERICA'S
MOST EXTENSIVE
LINE OF
MILLING SPINDLES!

From 1 to 200 HP with standard tapers, #20 to #60. To satisfy every milling demand — enclosed, totally enclosed fan-cooled, high cycle and liquid-cooled. Motorized or Belt-Driven. Variable, single or multiple speed motor — Speed to suit your application.

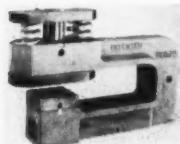
A milling spindle for every purpose... and more than that... a milling spindle reflecting in its SUPER CAPACITY AND TROUBLE FREE OPERATION the four decades of its maker's experience in spindle manufacturing. And "special problems"?... get the answer from Standard experts!

FOR COMPLETE SPECIFICATIONS AND DIMENSION DRAWINGS OF MORE THAN 75 MILLING SPINDLES, WRITE TODAY!

SUPER PRECISION SPINDLE DIVISION
SINCE 1912
the **STANDARD** electrical tool co.
—**STANDARD SETS THE PACE!**—

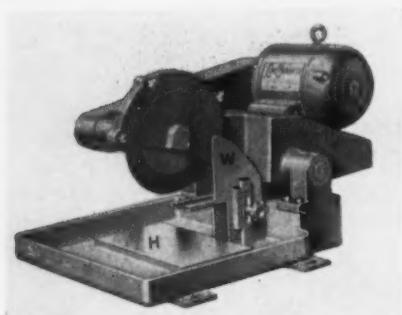
2487 RIVER ROAD • CINCINNATI 4. • OHIO

For more data circle 483 on Postpaid Card



Strippit Punching Unit

new shop equipment . . .



Cincinnati Abrasive Cut-Off Machine

ation through a "building block" program announced by The Cincinnati Electrical Tool Co., 367 Mt. Hope Ave., Cincinnati 4, Ohio. The photo shows the abrasive cut-off head with the splash pan, splash guard (W) and mounting pad (H) for mounting vise or holding fixture. This head can be furnished with or without the splash pan and mounting pad. A precision vise for close tolerance work and air or hydraulic cylinders for automatic control of head are among the features available.

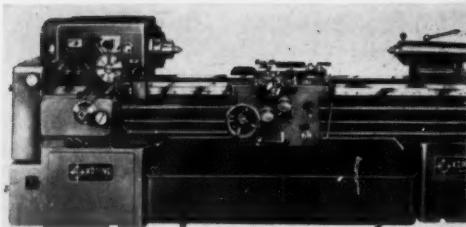
The heads are equipped with either 7½ or 10 h.p. heavy duty motor and are arranged to use 16 by 3/32 inch abrasive cut-off wheels.

For more data circle 125 on Postpaid Card

★ modern machine shop ★

24 INCH LATHE

Homestrand, Inc., Larchmont, N.Y., announces a new 24 inch lathe, the Koping S12CL. The machine is rated for 20 h.p. and has 18 spindle speeds up to 2,000 r.p.m. It has flame hardened ways and features fully enclosed feed gear box and apron. The 4 3/8 inch o.d. spindle has a 2 1/8 inch bore and a standard L-2 nose. 90 threads from 1/8



Above is the Koping S12CL 24 Inch Lathe

to 60 t.p.i. can be cut. 50 longitudinal feeds from 0.003 to 0.112 inch are available. The headstock is pressure lubricated with all shafts running in SKF bearings. The apron lubrication system is automatic and also lubricates the ways. The unit is available with 40, 60 and 80 inch center distance. For more data circle 126 on Postpaid Card

★ modern machine shop ★

FINE FLUTED MILLING CUTTER FOR TOUGH ALLOY STEELS

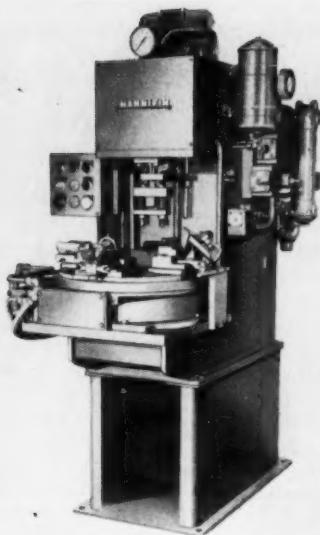
Ground from solid carbide, a fine fluted milling cutter for extremely tough alloy steels is announced by M. A. Ford Mfg. Co., 1545 Rockingham Rd., Davenport, Iowa. The tool produces a finish comparable to that of grinding, due to higher s.f.m. and wider feed range.

For more data circle 127 on Postpaid Card

★ modern machine shop ★

HIGH SPEED HYDRAULIC PRESSES

"FD" Series high speed hydraulic presses, for forming, trimming and force-fit assembly operations, are announced by Hannifin Co., Dept. 166, 565 South Wolf Rd., Des Plaines, Ill. They are offered in bench models in 2, 3, 4, 5 and 6 ton capacity and in floor models in 6, 8, 10, 12 and 15 ton capacity. Steel bases are also available for all bench models. Dual hand and



The Hannifin FD Series Four Ton Press

adjustable down-stroke controls are standard and electric pushbutton control, with or without pressure reversal, is available. The return stroke is adjustable, permitting shortening of the work cycle to where the ram just clears the workpiece on repetitive operations. Tonnage is adjustable from 10 percent of capacity to full, rated capacity. Any press is available to J.I.C. standards.

For more data circle 128 on Postpaid Card

★ modern machine shop ★

NEW LINE OF GRINDERS

Thomas C. Wilson, Inc., Long Island City 1, N. Y., announces that the 902

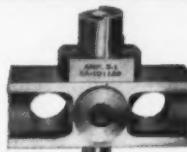


Wilson Series 902 Horizontal Grinder

July, 1959

NEW FLUSH PIN AMPLIFIER

OFFERS 5 to 1 AMPLIFICATION



- No dial indicator needed • No master required
- Extremely rugged • Speeds up inspection • .001 to .010 tolerance range. WRITE FOR DETAILS.

HOLMES GAGE & DEVELOPMENT CORP.
Columbus 3, Ohio

For more data circle 484 on Postpaid Card

HOLES

WITH PRECISION ADJUSTMENT
M-3 H.S.S. OR CARBIDE



 Clark "FINISHING CUTTERS"
P. O. BOX 990 BEVERLY HILLS, CALIFORNIA

For more data circle 485 on Postpaid Card

ANOTHER PANNIER MASTER MARKER!



PANNIER'S INSPECTORS' HAMMERS WEAR LONGER

Many styles and sizes for metal marking. Letters, numbers or symbols on either or both ends; interchangeable type heads available.

Write for data.



MONEY-SAVING FEATURES:

- Sturdy, balanced construction
- Long-lasting tool steel head
- A style for every (any) need
- Sharp, clean marking

 MARKING DEVICES
THE PANNIER CORPORATION

202 Sandusky Street • Pittsburgh 12, Pa.

Offices: Los Angeles • Chicago • Cleveland • Philadelphia • Birmingham

For more data circle 486 on Postpaid Card

new shop equipment . . .

Series, in its new line of portable pneumatic grinders, consists of 4 inch heavy duty horizontal grinders, wire brushing machines and horizontal buffers. Grinders and wire brushing machines offer a choice of three speeds, 12, 9 or 7.2 thousand r.p.m. Straight, lever or grip type handles may be specified. The horizontal buffers, which have a spindle 1 inch longer than that

of the grinders and wire brushing machines, are available in two speeds, 12 or 9 thousand r.p.m. There is a choice of straight, lever or grip type handles.

For more data circle 129 on Postpaid Card

★ modern machine shop ★

FIVE POSITION TURRET HEAD FOR DRILL PRESSES

A five position turret head, the Quindrill, is announced by Chicago Quadrill Co., 1854 Busse Hwy., Des Plaines, Illinois.

This unit makes possible five different operations on one drill press—drill, ream, countersink, counterbore and tap—without changing setups.

Quindrills supplement the company's present line of four position Quadrills and are available in sizes to fit almost any drill press, including 15 and 20 inch Deltas, for Morse and Jacob taper spindles.

For more data circle 130 on Postpaid Card

**First
and
Foremost**

NOBUR'S
Job Tested
TEAM

for

*** DEBURRING
* CHAMFERING**

the NOBUR



for machine deburring and chamfering of line-drilled and otherwise inaccessible hole surfaces.

for the automatic deburring and chamfering of front and back hole faces simultaneously in sheet metal, etc.



the NOBURMATIC



the NOBURROD



for rapid deburring and chamfering the outer ends of rods, tubes and bosses.

for rapid deburring and chamfering openly accessible hole faces.



the NOBURSINK



NOBUR

MANUFACTURING CO.

6860 Farmdale Ave., No. Hollywood, California

For more data circle 487 on Postpaid Card



Chicago Quindrill

HEIGHT SIZE GAGE UNITS

The Van Keuren Co., 175 Waltham St., Watertown 72, Mass., announces a dimensional gage, called the Hyt Size Gage. It enables the operator to set exact dimensions, accurate to 0.000050 inch, and eliminates the need for the time-consuming assembling of gage blocks. Through the use of a transfer gage it is possible, in a matter of seconds, to be ready to inspect drill jigs, lathe fixtures, gears, cams, splines, profiles and contours—and to check many shop operations. It is said that setting of precision depths on drill presses, milling machines and jig borers, is simple with this gage.

A spring loaded non-rotating spindle eliminates all chance of backlash; measuring surfaces are accessible from front and back; slots in the base



The Hyt Size Gage

permit clamping to an angle plate so the gage can be used in a horizontal position. It is said that the light weight of the gage makes it readily portable, for use in any part of the shop.

For more data circle 131 on Postpaid Card

★ modern machine shop ★

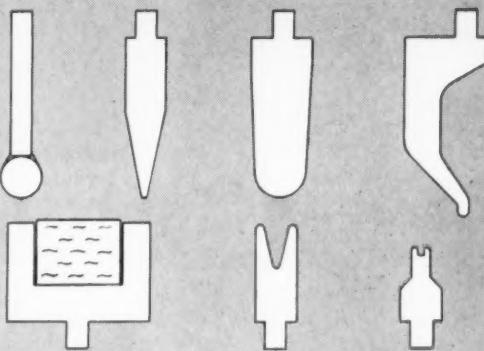
AIR-HYDRAULIC PRESSES

A line of air-hydraulic presses, in 1, 2½ and 6 ton capacities, is announced by Jackson Fluid Power Co., 16722

Alloy Forming for
AIRCRAFT
MISSILES
ROCKETS
and
OTHER FABRICATIONS

CHICAGO ALLOY-FORM DIES

For All Makes of Press Brakes



Here are a few of the commonly used types of CHICAGO Alloy-Form dies available for prompt delivery. For further data ask for Bulletin AFD-958. Complete recommendations and quotations on Alloy-Form dies or any special die upon request.



DREIS & KRUMP
.MANUFACTURING CO.

7418 S. Loomis Blvd., Chicago 36, Ill.

8741

Press Brakes • Press Brake Dies • Straight-Side-Type Presses
Hand and Power Bending Brakes • Special Metal-Forming Machines

For more data circle 488 on Postpaid Card

modern machine shop 223

new shop equipment . . .

East Warren Ave., Detroit 24, Mich. A novel air or hydraulic booster principle provides positive full hydraulic power for the press operation while utilizing shop air pressure for speed. Non-impact and non-surge hydraulic



RELIANCE

Angle Dresser \$37.50 Radius Dresser \$57.00

Shipped on 10-day Money-Back Guarantee

Angle Dresser guide block is hardened and honed, push bar is hardened and ground. Radius Dresser bearing adjustment is lifetime. Both tools are finished in black wrinx enamel. Diamond, \$7.50.

Order direct. We pay postal charges.

RELIANCE TOOL & MFG. CO.
1919 Clybourn Ave., Chicago 14, Ill.

For more data circle 489 on Postpaid Card

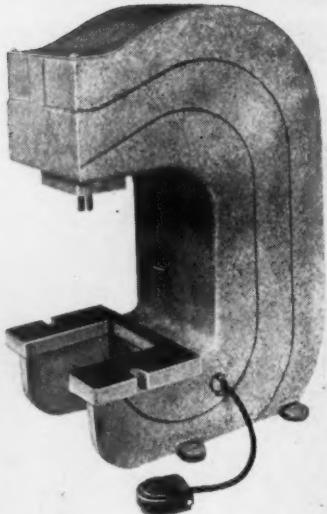
COOK

Now you can obtain non-marring Lead hammers — Hammer handles — Make 'em yourself — Production and Ladle Molds. Free folder — ask about our Remelt allowance service.

COMPLETE LEAD HAMMER SERVICE

ALL AT LOW LOCAL PRICES
COOK'S LEAD HAMMER SERV.—E. PROV. 14, R.I.
WESTERN DIVISION—HY. FLEX
4271 STATE ST., POMONA, CALIF.

For more data circle 490 on Postpaid Card

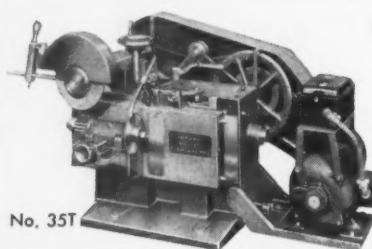


View of Jackson Air-Hydraulic Press

force is maintained throughout the complete power stroke and can be regulated from full force down to 50 percent of rating. Speed of the power stroke can be regulated from a creep to over 3,000 strokes per hour.

The units are available with optional floor stands. Controls furnished may be dual safety hand lever, dual electric pushbutton, automatic reverse on pressure or distance, and full automatic cycle.

For more data circle 132 on Postpaid Card



SHARPEN YOUR SAWS Automatically, In Gangs

Just think of it! 100 26 gauge saws sharpened at one time. Takes saws up to 5½" dia. and 1¾" thick. Saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR 35T

THE WARDWELL MFG. CO.
3803 Ridge Road Cleveland 9, Ohio

For more data circle 491 on Postpaid Card

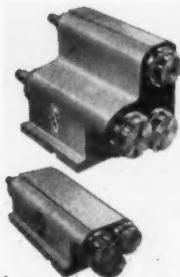
LINE OF BORING SPINDLES

The cluster design of boring spindles, shown in the accompanying illustration, identifies but two of the "endless versatile variations" in this character of assembly as produced by The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio.

Each unit incorporates two or more Super Precision Boring Spindles. Seven individual stock sizes are available to serve the average production requirement. The design of the housing, accommodating the multiple spindles, is directly related with the multiple holes that are to be machined.

Where unusually close center distance of holes involves a special design, the manufacturer is prepared to furnish special design of boring spindles.

For more data circle 133 on Postpaid Card



Cluster design of several Standard Boring Spindles

CABINET DUST COLLECTOR

A cabinet cloth filter type dust collector, operating in the 650-1,535 c.f.m. range, has nearly 100 percent dust filtering efficiency, according to Torit Mfg. Co., Walnut and Exchange Sts., Dept. 714, St. Paul 2, Minn. Overall collection efficiency of the collector, the Model 90, is in excess of 99.9 percent by weight, even with a high concentration of particles smaller than 1 micron. This high filtering

New IDEAL GOLD BAND

LIVE CENTERS

GUARANTEED TO MATCH ACCURACY AND CAPACITY OF YOUR LATHES

In the GOLD BAND line Ideal has combined the latest production methods with their traditionally fine craftsmanship to bring you an unequalled standard of excellence in live centers. Accurate, ($\pm .0001"$) GOLD BAND Live Centers offer "custom" quality at production prices. Specify GOLD BAND Live Centers and your every need can be accommodated from stock . . . 99 times out of 100.

Ideal's GOLD BAND Live Centers offer savings, simplified operations and higher lathe output both in quantity and quality. Contact your distributor today!



A COMPLETE LINE FOR EVERY NEED—SPECIALS TOO!



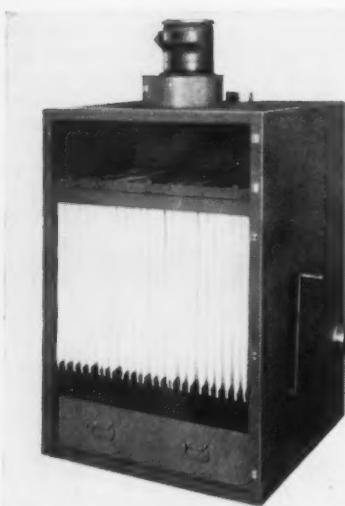
Write for
Complete catalog data and specifications.



IDEAL INDUSTRIES, Inc.
1031-G Park Ave.
Sycamore, Illinois

For more data circle 492 on Postpaid Card

new shop equipment . . .



Torit Model 90 Cabinet Dust Collector

efficiency permits the filtered air to be recirculated indoors, thus saving heated or conditioned air.

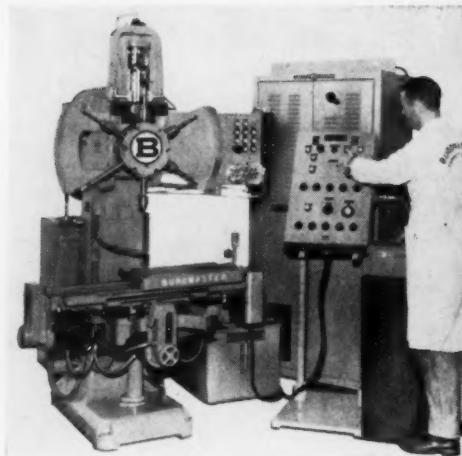
The standard Model 90 contains a pull-out drawer with 5.5 cubic feet capacity. Equipped with hopper base, dust capacity is 9 cubic feet.

For more data circle 134 on Postpaid Card

★ modern machine shop ★

**HYDRAULIC CIRCUIT FOR
TURRET DRILLING MACHINES**

Burgmaster Corp., 15001 South Figueroa St., Box 311, Gardena, Calif., announces the improved hydraulic circuit for Burgmaster 2 BH and 3 BH Automatic Hydraulic Turret Drilling, Tapping and Boring Machines. It insures a positive constant feed rate, in and out, whether the machine is cutting air or actually machining a part. This hydraulic circuit produces several desirable results; in the case of tap-



3 BH Turret Drill with hydraulic circuit

ping, it eliminates the possibility of pulling out the last thread or opening up the size of the threaded hole. Moreover, there is no chance for the machine to settle after making a setup or a slow down when the cutting tool starts to cut, which would require an adjustment of the feed accordingly.

The hydraulic circuit includes a Vickers Pressure Compensating Hydraulic Valve. Oil is metered in and out of the head end of the cylinder, thereby disregarding any changes in feed which might result from the volume of the hydraulic cylinder rod. Addition of the Vickers Pressure Compensating Flow Control Valve permits accurate calibration of the Flow Meter. **For more data circle 135 on Postpaid Card**

★ modern machine shop ★

DRILL UNIT

An automatic drilling unit is announced by Govro-Nelson Co., 1931 Antoinette Ave., Detroit 8, Mich. Known as Model KHB, economy of this unit involves both initial and

COLDPOINT DRILL

"The drill that hasn't been stopped yet!"

If you have a drilling problem, we think we can solve it. We can sell you the drills or do your drilling on a contract basis.

MOSSBERG, INC.
7824 HAMILTON AVENUE
CINCINNATI 31, OHIO

For more data circle 493 on Postpaid Card

"SEALFLEX" TUBING



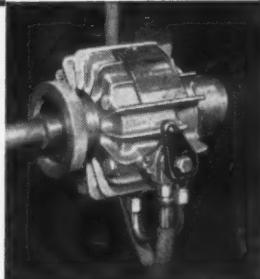
**Leakproof—
Stays in place
For Coolants, Cutting
Oils, Solvents**

Made of steel with brass fittings — males, nozzles, stopcocks, etc., made in $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " I.D. Write for bulletin and prices.

VERMONT FLEXIBLE TUBING CO.
Lyndonville, Vermont

For more data circle 494 on Postpaid Card

**WILSON
AIR
COLLET
CLOSER**



STEP UP PRODUCTION 20% +

... for most lathes to 1"
bar stock capacity

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

WILSON AIR COLLET CLOSER, INC.
909 40th Ave. NE, Minneapolis 21, Minn.

For more data circle 495 on Postpaid Card

**How SQUARE HOLED SLEEVES
SPEED UP TOOL-MAKING!**

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



SLEEVES MADE IN FOLLOWING SIZES:

3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE, INC.
23516 TELEGRAPH ROAD • DETROIT 41, MICH.

**Write for
Literature**

For more data circle 496 on Postpaid Card

new shop equipment . . .



Govro-Nelson Model KHB Drilling Unit

installation costs. The Model KHB includes its own built-in feed, so that shop air is not required. This eliminates installation expenses involved in air controls and plumbing, as well as maintenance cost of air equipment. Also included in this unit is an infinitely variable hydraulic rate of feed control, with adjustable rapid approach to control the tool at entry and at break-through.

Installation expense in the electrical controls has been reduced to the minimum. Model KHB will rotate and feed the tool into the work when motor is turned on, and will withdraw when motor is turned off. Accurate depth will be held, as the unit will dwell against a positive stop at end of stroke.

To put into operation, Model KHB (with feed and hydraulic controls all included) is merely mounted on a plate and driven by an electric motor through a belt drive. Several units may be run from one pushbutton or one motor, if belting is so arranged. **For more data circle 136 on Postpaid Card**

★ modern machine shop ★

DEVICE FOR GAGING SPLINED SHAFTS

The Splinedicator, developed by Vinco Corp., Detroit, Mich., is a depar-



Splinedicator for gaging splined shafts

ture from the customary methods of gaging splined shafts. The Splinedicator combines the function of five gages, replacing the Go and Not Go composite rings and master plugs for each; also answers the unsatisfied demand for a master ring to check the spline gage for the internal spline.

The indicator of the gage is set by means of a master setting plug of verified tooth thickness. The Splinedicator gives an accurate check of the effective tooth thickness, eliminates human error, shortens inspection time, detects back taper, affords unlimited gage life and is adaptable for semi-automatic gaging. Accuracy is consistent, repeating in the same index position with the master within 0.00005 inch; repeating in any index position with the master within 0.0001 inch. There is no loss of part tolerance due to gage tolerance because the tooth thickness of the set master is known, thus permitting exact part limits to be established on the dial indicator. This feature makes the Splinedicator valuable for the inspection of parts with close limits.

For more data circle 137 on Postpaid Card

★ modern machine shop ★

LIVE CENTER

Webster Machine Products Co., P.O. Box 92, Thompson Rd., Webster, Mass., announces the Rotor Live Center, which is a very high precision center with a triple bearing design that



TAP BUSHINGS

Drives all standard taps from No. 0 to 1 1/2" and pipe taps from 1/8" to 1". Five o.d. sizes.

LESS TAP BREAKAGE

LESS TAP WEAR

Write for Bulletin

BYCO INDUSTRIES

2200 SNELLING AVE., MINNEAPOLIS, MINN.

For more data circle 497 on Postpaid Card

CAMS

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.

23-16 44th Road Long Island City 1, N.Y.

For more data circle 498 on Postpaid Card



There's more than luck to CLOVER COATED ABRASIVES . . .

The man who has used Clover Abrasives for years is apt to believe in luck. *He is lucky* that he has been introduced to Clover products. But that kind of good fortune is built in when the product is made. Part of it rests in our discriminating choice of the best materials available; the other part in the care real craftsmen use in making a tool.

Fifty-odd years of experience have proven many times that Clover Coated Abrasives are a lucky choice because they are made for hard service. Ask your Clover Distributor for samples or for a new Clover Catalog, or write us direct. You owe it to yourself to see the Clover line.

Clover Manufacturing Company
Norwalk, Connecticut

Makers of the famous

CLOVER Grinding and Lapping **COMPOUNDS**

For more data circle 500 on Postpaid Card

July, 1959

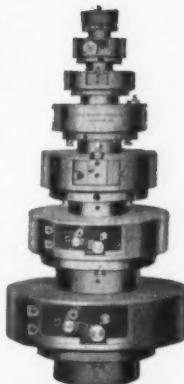
modern machine shop 229

MUMMERT-DIXON FACINGHEADS

Two-way tool feed in 9, 12, 16, 20, 24, 30, 36, 40 and 46 sizes.

One-way tool feed in 6, 9 and 12 sizes. Automatic feed — convenient tool adjustment — quick feed reverse. Save time and costly set-ups.

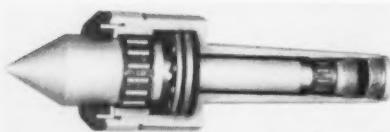
*Write for
folder.*



MUMMERT-DIXON CO.
120 PHILADELPHIA ST. • HANOVER, PA.

For more data circle 499 on Postpaid Card

new shop equipment . . .



Webster "Rotor" Precision Live Center

fully supports the workpiece through the entire length of shank. Two adjustable roller bearings are provided, plus a large thrust bearing to take all axial thrust of workpiece. Built in Simmer oil seals to protect bearings from dirt and chips, Rotor Centers are available in stock from Nos. 1 to 6 M.T. and, also, large interchangeable head bull centers. The Rotor Center is spring loaded to compensate for the heat expansion of machining the workpiece. Fine workmanship and quality of material guarantees trouble-free long life performance. Each Rotor Center is numbered, individually tested and guaranteed by the manufacturer for accuracy of concentricity up to 0.000080 inch (80 millionths).

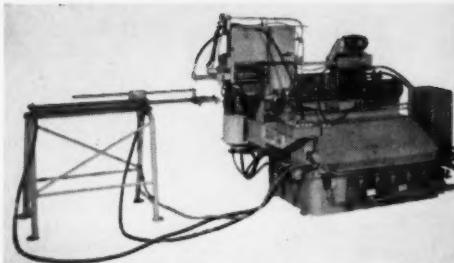
For more data circle 138 on Postpaid Card

★ modern machine shop ★

AUTOMATED TUBE BENDER

Wallace Supplies Mfg. Co., 1804 West Cornelius Ave., Chicago 13, Ill., has developed a completely automated bending machine, adaptable to a variety of production tube bending jobs. Press the button and the bender feeds tubes into position, bends them and removes the bent tubing without attendance, other than to keep the inlet conveyor or hopper supplying tubes. Two tubes can be processed during each operating cycle of the machine. Simple tooling changes provide versatility in the type of bends.

Among the features of this machine are a provision of an audible alarm



Wallace Fully Automated Bending Machine

that warns material handlers that 30 minutes or less remain before the tube supply will be empty; a speed and rotation control of the hydraulic bending cycle to give different bends or speeds and a pressure system of internal lubrication including internal lubrication of the tubes and mandrels. For more data circle 139 on Postpaid Card

★ modern machine shop ★

FINGERTIP CONTROL OF 500 POUND WORKPIECES

A new work positioning combination with fingertip control enables one man to handle 500 pound workpieces as though they were sacks of feathers. Developed by Wilton Tool Mfg. Co., Inc., Schiller Park, Ill., the unit is called Air Hydraulic PowRarm No.



Wilton Air Hydraulic PowRarm No. 396

HOLES



HIGH-PRODUCTION

CLOSE TOLERANCE IN ONE PASS



Clark "HOLE MILLS"
P. O. BOX 990 BEVERLY HILLS, CALIF.

For more data circle 501 on Postpaid Card

JIG GRINDING and JIG BORING

to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.

ROUTE 22, MOUNTAINSIDE, N. J.

Telephone: ADams 2-7300

For more data circle 502 on Postpaid Card

STEEL
Stanho
PRODUCTS

MACHINE
KEYS

FLAT BOTTOM
WOODRUFF
KEYS



TAPER
PINS



the Quality Line

of Precision Made Steel Products

KEYS - ALL TYPES • COTTER PINS

TAPER PINS • STRAIGHT PINS

MACHINE RACK • SPECIAL PARTS

KOOLHEAD Foundry Chill Nails

WRITE FOR
DESCRIPTION
and PRICES

STANDARD

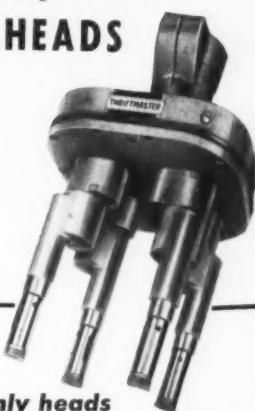
HORSE NAIL CORP.
Since 1872
NEW BRIGHTON PA

For more data circle 503 on Postpaid Card

July, 1959

Buy

THRIFTMASTER Double Eccentric Adjustable DRILLHEADS



. . . the only heads
of this type standard with
Full Ball Bearing Construction

- greatest flexibility in drilling irregularly spaced holes
- sustained accuracy for trouble-free operation
- 20 Standard Models—3 to 8 Spindles
- Special Models on Order

Write today for complete information on this dependable Double Eccentric Adjustable Drillhead . . . the latest addition to the Thriftmaster line of Single Eccentric, Universal Joint Type Adjustable and Special Fixed Center Drillheads.

Also Makers of DORMAN AUTOMATIC REVERSE TAPPERS



1034 N. PLUM STREET • LANCASTER, PENNSYLVANIA

For more data circle 504 on Postpaid Card

new shop equipment . . .

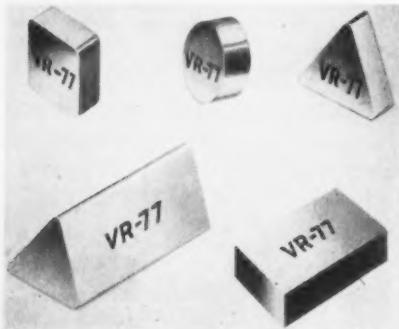
396. It consists of a heavy duty Wilton Hydraulic PowRarm connected to an air-hydraulic booster. The unit is activated by a foot pedal or hand control, operated from the factory air supply. The instant the control is touched, the workpiece is released or locked in position, as the operator chooses. Unique construction makes it possible to move the workpiece to any position, in all three planes, for convenient approach. The air-hydraulic system adds fingertip ease and remote control. **For more data circle 140 on Postpaid Card**

★ modern machine shop ★

CARBIDE AVAILABLE IN 34 NEW STOCK SIZES

Thirty-four new stock sizes of VR-77 Carbide are announced by Vascoloy-Ramet Corp., 840 Market St., Waukegan, Illinois.

Excellent shock resistance and very high resistance to deformation by heat have made VR-77 the proven answer to many extremely tough cutting jobs. It is an outstanding carbide grade for heavy roughing and interrupted cutting of steel—including high tensile strength and heat resistant alloys.



VR-77 Carbide comes in 34 new sizes

New stock items include many sizes of square and triangular throw away inserts for both positive and negative rake toolholders. Other additions consist of blanks, full length inserts and tipped tools.

For more data circle 141 on Postpaid Card

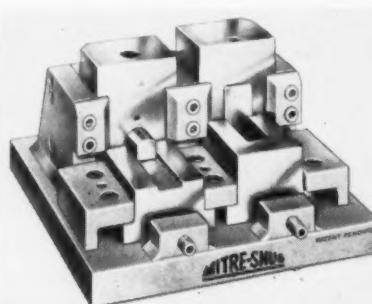
★ modern machine shop ★

UNIT CAN MITRE BOTH ROUND AND SQUARE TUBING

Vogel Tool and Die Corp., 1823 North 32nd Ave., Stone Park, Ill., announces the Mitre-Snug which combines two operations in one, providing a fast, easy and economical means to mitre both round and square tubing, including preformed shapes. The unit produces close-fitting, true-mitre joints that can be either brazed or induction welded without the need for filing or deburring.

In most cases, both the first and second cuts can be mitred in a single downstroke of the punch press. The tubing or stock is fed horizontally into the left hand die to form the first cut, after which it is angled downward into the right hand die for the second or final cut. Both cuts are completed in a single press stroke by feeding two pieces at a time into the Mitre-Snug.

The Mitre-Snug is precision built to afford maximum cutting life and to



Shown above is the Vogel Mitre-Snug Unit

IMMEDIATE DELIVERY!



Cadmium plated, large selection of styles and sizes. Specials on request. Send for FREE catalog.

MACHINE PRODUCTS Corporation

6721 E. MINICHOLS ROAD • DETROIT 12, MICHIGAN

For more data circle 505 on Postpaid Card

Accurate Hole Transfer Made Easy With

NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from $\frac{3}{16}$ " to $\frac{3}{4}$ " U.S.S. Inexpensive — Last for years.



Write for Circular

NIELSEN TOOL &

DIE COMPANY

17336 Lahser Road
Near Grand River
Detroit 19, Michigan

For more data circle 506 on Postpaid Card



save 20 to 30% on new
CARBIDE TOOLS

RICO has a complete line of:

- Quality rotary carbide & HSS tools
- Available for immediate delivery
- Big savings on new tool costs
- Up to 50% savings on regrinds
- Special tools to specifications
- Distributor inquiries invited about better profit margins with RICO TOOLS.

Attach ad to your letterhead for more information.

RICO TOOL CO.

5915 DIXIE HWY. • SAGINAW, MICH.

For more data circle 507 on Postpaid Card

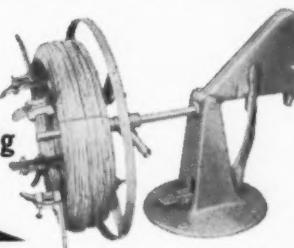


July, 1959

For REEL Efficiency...

NILSON WIRE and RIBBON STOCK REELS

3 TYPES—8 MODELS



3 Tilting Reels

Portable reels for easy loading of heavy coils. Coil Capacity: 150, 225 and 525 lbs., respectively.



2 Clutch Reels

Oscillating motion eliminates slippage of stock. Coil Capacity: 175 and 250 lbs., respectively.



3 Stationary Base Reels

Economical reels for general-purpose production. Coil Capacity: 75, 150 & 225 lbs., respectively.

In addition to these standard models, we can build variations to meet special requirements. Write today for your copy of the Nilson Catalog on Wire and Ribbon Metal Stock Reels!

NILSON

THE A. H. NILSON MACHINE CO.

603 Bridgeport Avenue • Shelton, Conn.

For more data circle 508 on Postpaid Card

new shop equipment . . .

provide for the interchangeability of punches and dies of various sizes and cutting angles.

For more data circle 142 on Postpaid Card

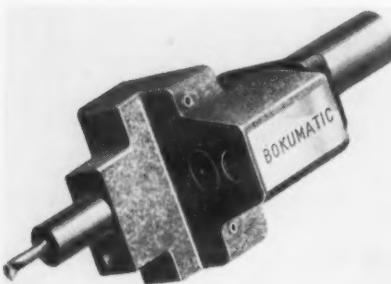
★ modern machine shop ★

HOLDERS FEATURE FASTER INTERNAL CUTTING

Metalworking operations requiring internal grooving, back chamfering, thread recessing or special internal forming have been greatly simplified and speeded up by a new series of holders for internal cutting tools, announced by Bokum Tool Co., 14755 Wildemere Ave., Detroit 38, Mich. The line is known as Bokumatic RT Series. Actuation is by means of a stop rod against the spindle or spindle guard or with a drawbar.

During operation, movement consists of a horizontal, straight-line entry with a dovetail side action during cutting of as much as 0.072 per side in the smallest holder to 0.350 on the largest unit. Because of the preset adjustment, there is a minimum of waste cutting motion—actual metal removal starts as much as two seconds sooner than in conventional holders.

For more data circle 143 on Postpaid Card



The Bokumatic RT Series Toolholder



Carbide hand files with offset handle

CARBIDE HAND FILES

Severance Tool Industries, Inc., 724 Iowa St., Saginaw, Mich., has added two new series of carbide hand files to its line. The series feature an offset handle. One style comes with a knob on the forward end and the other style is plain. Both are available in a range of five cuts from fine (40 teeth per inch) to coarse (16 teeth per inch). Chilled iron, hardened die steel, glass, ceramics, plastics, spring steel, hardened forgings, tile and bakelite are examples of material that yield to the carbide hand file.

When dull, a Severance Carbide Hand File can be resharpened many times. Severance features this Regrinding Service as a cost cutting procedure.

For more data circle 144 on Postpaid Card

★ modern machine shop ★

NEW DESIGN FOR BORING BARS

Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Mich., has developed a new design for boring bars. This micro-adjustable boring bar can carry interchangeable heads for boring holes from $\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter. Each head can be adjusted to cut up

New Ideas in Cutters

★ Designers and manufacturers of H. S. S., tantung, and carbide cutters based on cost saving principles. Form relieved, hard faced cutting edges, throwaway inserts, welded bodies, semi-finished blanks, clamped-on blades. Serving America's metal working, carbon, graphite, valve, and instrument manufacturers. Write or phone LUDlow 8400 for latest catalog.

NIAGARA CUTTER

Division of Bollier-Damerell, Inc.
332 Niagara St., N. Tonawanda, N. Y.



For more data circle 509 on Postpaid Card

REICH—THE ONLY 3-WAY PRECISION TEST INDICATOR

Accurate and repeated reading in either direction. No mirror needed to read both sides or top. Non rust, non magnetic movement. .014" reading.

Price \$9.00

Write for folder.



J. R. REICH MANUFACTURING CO.
201 E. Stroop Road Dayton 29, Ohio

For more data circle 510 on Postpaid Card

SHARP NAMEPLATE MARKING

Model
No. 4



The nameplate on your product is your signature. Keep it neat and legible. Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.

- Simple Operation
- Perfect Alignment
- Uniform Depth

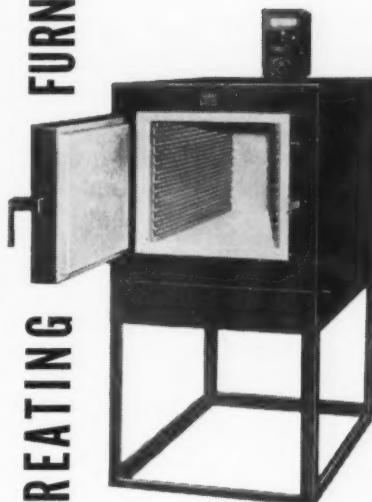
GEO. T. SCHMIDT, INC.
1806 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS



For more data circle 511 on Postpaid Card

July, 1959

FURNACE



GENERAL PURPOSE HEAT TREATING

The Lucifer 7055 Series was designed for hardening, annealing, drawing, preheating and special applications. Produced in 13 standard models with heat ranges of 2,000°F. and 2,300°F., the 7055 Series operates on standard line voltage. No transformer is necessary. All models include . . . automatic controls, thermocouple, lead wire, magnetic contactor, horizontal swing door or vertical lift door, positive seal cam lock, cast hearth plate, long-life elements (low watt density), and our exclusive one piece monolithic holders that permit rapid element replacement at a minimum of down-time.

For a free brochure or engineering advice, write, wire or call . . .

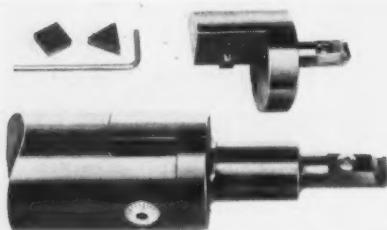
LUCIFER FURNACES, INC.

Neshaminy 6, Pennsylvania
Diamond 3-0411

For more data circle 512 on Postpaid Card

modern machine shop 235

new shop equipment . . .



Wesson Micro-Adjustable Boring Bar

to a $\frac{1}{2}$ inch larger diameter, so that it is possible to cover the complete range with four heads. Also, each head can be adjusted slightly undersize so that some holes less than the nominal size can be bored.

Because length-to-diameter ratios of boring bars are critical, these bars are stocked partially finished. Heads are finished to required lengths (limits depend on hole diameter) for specific applications. Interchangeable heads can be completed for use of either triangular or square carbide throw away inserts.

The basic bar and the ends of the interchangeable heads, that are fastened to the basic bar, are made with fixtures so that additional heads can be obtained at any time for use with an existing bar.

For more data circle 145 on Postpaid Card

★ modern machine shop ★

BALL BEARING DIE SET

E. W. Bliss Co., Die Supply Division, 1400 Brookpark Rd., Cleveland, Ohio, is offering a ball bearing die set that assures positive alignment of punches and dies, eliminating burred parts, reducing rejects and extending the life of dies between regrinds. Moreover, the new die set is so easy to assemble and disassemble that it mate-



Ball bearing die set with lamination die

rially reduces the time spent in die building and changeover. The die set can be "stripped" from the guide posts, an advantage when used on inclinable and straight side presses.

Preloaded ball bearings provide "negative clearance" so that, even after millions of strokes, there is no chance of dies shifting and breaking down because of misalignment.

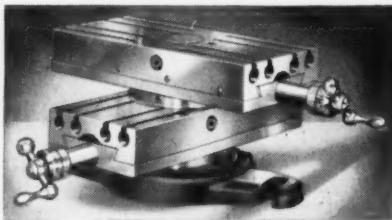
In addition to use in die sets, Bliss ball bearing assemblies can be used whenever reciprocating, rotary, linear or oscillating motions are involved.

For more data circle 146 on Postpaid Card

★ modern machine shop ★

UNIVERSAL TABLE

Providing for almost unlimited position control, a universal table, announced by South Bend Lathe Works, 425 East Madison St., South Bend 22, Ind., affords the greatest amount of



The South Bend Lathe Universal Table

flexibility for milling, drilling and for use on the shaper. Both upper and lower slides have graduated swivels and may be turned through full 360 degrees.

Slides can be used without graduated swivels to reduce height, if desired. They can be positioned at any angle with each other and may be turned individually or together. Each slide has feed screw with micrometer collar reading in thousandths of an inch.

Dovetails are equipped with full length gibs for take-up. The precision ground work surface is 4 by 8½ inches and maximum travel is 4 inches for either slide. Table has four slots for clamping work.

For more data circle 147 on Postpaid Card

★ mms ★

BAND SAW AND BAND FILER

Boice - Crane
Co., 937 West

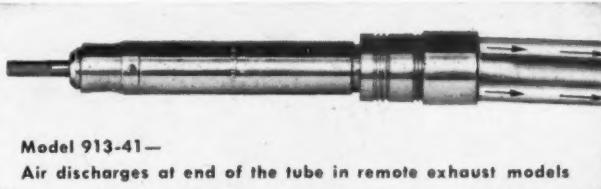


Band Saw and Filer

Central Ave., Toledo 6, Ohio, announces an improvement in its metal cutting band saw and band filer. It is the provision for mounting a blade butt welder. Ideal in production on tools, dies and patterns, this tri-purpose machine cuts continuously with no backstroke, precision saws and files in one-tenth the time. It sands wood and grinds metals, including hard alloys and carbon steels, plastics and fiber. For more data circle 148 on Postpaid Card

NEW WILSON

Pneumatic Die Grinders for better, faster filing, grinding, cutting and polishing jobs



Model 913-41—

Air discharges at end of the tube in remote exhaust models

These small, powerful tools are valuable time savers on a wide range of work in tool and die shops, machine shops, pattern shops and foundries for a variety of filing, grinding, cutting and polishing work. Available in 40,000 and 60,000 rpm models. Write for Catalog PT-58.

**Wilson also makes
a wide range line of
PNEUMATIC
Horizontal Grinders**

TW-894A



THOMAS C. WILSON, INC.

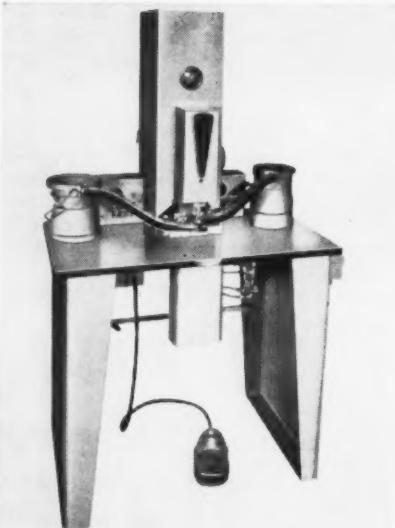
21-11 44TH AVENUE, LONG ISLAND CITY 1, N.Y.

For more data circle 513 on Postpaid Card

new shop equipment . . .

AUTOMATIC MACHINE INSERTS WIDE RANGE OF SMALL PARTS

Hill Machine Co., 1301 Eddy Ave., Rockford, Ill., announces the Sertomat Automatic Inserting Machine, that can be used on a wide variety of small parts. Parts are fed from two hoppers



READING BENCH KEYSEATER

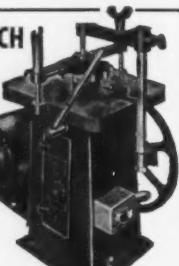
Portable — move directly to job; time saver for both small and large shops.

.334" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

**READING MACHINE CO.
CINCINNATI 37, OHIO**



For more data circle 514 on Postpaid Card

JIG BORING

and

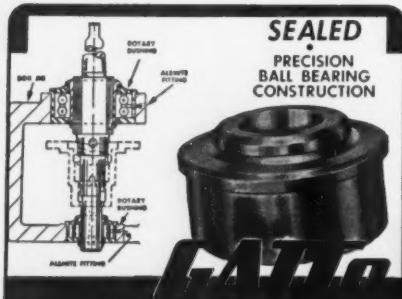
Large Precision Machining

Done to your specifications

We have 22 Jig Borers

KIDDE PRECISION TOOL CORP.
15 LOCUST AVENUE ROSELAND, N. J.

For more data circle 515 on Postpaid Card



For more data circle 516 on Postpaid Card

ROTARY BUSHINGS FOR DRILLING, CORE DRILLING ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work - or both.

Eliminates expensive tool construction - Reduces tool wear - Prevents seizure and pilot breakage. Especially adapted where precision is required.

Write for full information and prices

ROTARY BUSHINGS

42336 ANN ARBOR ROAD PLYMOUTH, MICH.
Telephone Glenview 3-2295

a wide range of possible applications on such parts as terminals, connectors, pins, studs and many types of fasteners. Electrical interlocking permits usage in automated setups.

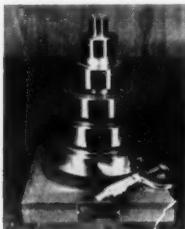
For more data circle 149 on Postpaid Card

★ modern machine shop ★

CHECKING INSTRUMENT

Size Control Co., 2500 West Washington Blvd., Chicago 12, Ill., announces the development of three new models of the mikemaster. A must item in most shops and toolrooms, it enables the inspector or operator to check his mikes, and other o.d. measuring tools, frequently to assure the accuracy of their reading.

New models are designated as follows: M-1, M1-1/2 and M-2. Model M-1 is in even inch steps, from 1 to 6 inches. Model M1-1/2 is made in steps of 1/2 inch, with a range of 1/2 to 6 1/2



Size Control
Mikemaster

inches, so that mikes may be checked in the range in which they receive the most wear. Model M-2 is used to check the 0-1 inch instruments, in steps of 0.100 inch.

For more data circle 150 on Postpaid Card

★ modern machine shop ★

UNITIZED TOOLING

A complete, standard heavy duty line (Series HD) of unitized tooling

One hand moves it
EASILY!

THE WELLS
MODEL
49A

"2 in 1" METAL CUTTING BAND SAW
WITH WHEELS AND HANDLE
(Optional Equipment)

With heavy duty, rubber tired, ball bearing wheels and one piece fold-down handle, the Wells Model 49A is a metal cutting band saw that's REALLY MOBILE . . . and VERSATILE. Use the 49A as a horizontal cut-off machine (capacity 3 1/2" x 6") or swing the head to vertical position . . . it's an upright band saw.

The optional wheel and handle unit, available for new machines and those already in service, is a tremendous time and labor saver. Ask your local Wells Distributor for details . . . or write for Bulletin 253-H.



For more data circle 517 on Postpaid Card

The Pioneers of Horizontal
**METAL CUTTING
BAND SAWS**
WELLS MANUFACTURING CORPORATION

808 Tyler Street, Three Rivers, Michigan

new shop equipment . . .

is announced by Tool Products Corp., North Tonawanda, N. Y. Designed for perforating various materials up to $\frac{1}{4}$ inch mild steel or its equivalent in tensile strength, these units have many

THE SCHWIETERMAN CENTER FINDER

Inside and outside diameters are located with machine spindle running, duplicating exact machining conditions. For jig borers, vertical & horizontal mills, lathes, drill presses, etc. From 74.50



PRECISION GAGE & TOOL COMPANY

320 E. Third St., Dayton 2, Ohio, USA

For more data circle 518 on Postpaid Card

GRIND THE *Eastern Centerless Way*

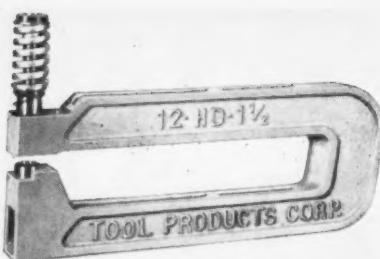
WE SPECIALIZE
20 CENTERLESS GRINDERS
ESTABLISHED 1939

Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.

For more data circle 519 on Postpaid Card



For more data circle 520 on Postpaid Card



Tool Products Series HD Unitized Tooling

features: alloy steel holder of high tensile-strength; built-in lubrication features; unit bottoms guaranteed flat and square with the centerline of the punch; punch and die easily removable while unit is mounted in the setup; shut height, die height and throat depths conform to established industry practice; high interchangeability of expendable parts, complying with accepted industry standards.

For more data circle 151 on Postpaid Card

★ modern machine shop ★

LENGTHENING AND SHORTENING SHIMS FOR SHOULDER SCREWS

For added tool room convenience and economy, Detroit Stamping Co., 340 Midland Ave., Detroit 3, Mich., announces ready-to-use lengthening and shortening shims for adjusting die

10 to 20 Times Longer Cutting Life Means Lower Tool Costs

"DIXIE" provides End Mills of solid carbide with cutting edges processed with exclusive "Micro-Finish" to assure the user of long-lasting, super sharp tools.

FOR PRECISION FINISHING



DIE SINKING, HOLE SIZING
AND CUSTOM TOOLING



SEND FOR OUR
NEW CATALOG

DIXIE TOOL INDUSTRIES
4555 W. FRANKLIN AVE.
BRIDGEPORT, MICHIGAN

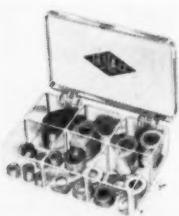
stripper bolts. (or shoulder screws). After grinding, shimming or repairing dies, the insertion of one or more De-Sta-Co lengthening or shortening shims establishes correct stripper plate height in seconds.

Made of selected spring steel, the De-Sta-Co adjustment shims will not break or mushroom under impact. Accurate thickness, smooth finish and close tolerance diameters permit precise adjustment in seconds.

The shortening shims fit closely against the head shoulder, while lengthening shims screw onto the threads and up against the thread shoulder. They cannot drop off while the screw is being inserted into the die counterbore.

A convenient assortment, packed in a handy plastic case, includes the six most frequently needed sizes in convenient decimal thicknesses.

For more data circle 152 on Postpaid Card



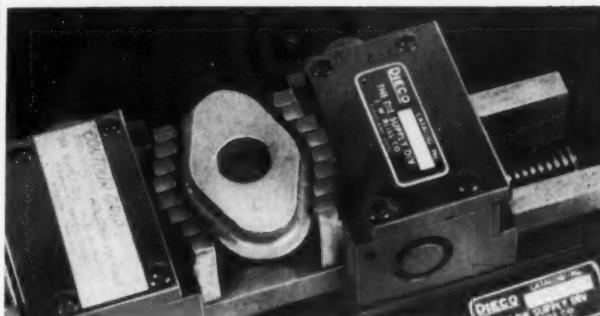
De-Sta-Co Shim Set

July, 1959

30 HORSEPOWER CHOP TYPE SAW

Development of an all-purpose chop or swing type, high speed metal saw is announced by Ty-Sa-Man Machine Co., 1101 White Ave., Knoxville 1, Tenn. It offers powerful 30 h.p. friction or abrasive cutting and can be used with a grinding wheel. It has a wide application in the metalworking field

CONTOUR GRIP



Set up any job in seconds

then take deeper cuts, faster feeds

Makes any tool more productive. Here's why:

Contour Grip is a standard fixture that holds any irregularly shaped part so tightly that you can feed faster and take deeper cuts. Use any type tool, eliminate need for costly special-purpose jigs and fixtures. Your operator sets up Contour Grip in seconds, then goes from piece to piece just by backing off the jaws, dropping the next piece in and tightening up. For long runs or short.

The secret of Contour Grip's strength is its individual steel fingers, each of which moves independently as it contacts the work. The fingers mold around the part, and then tighten up giving greater holding power and a more positive grip than any ordinary fixture can.

To learn how Contour Grip works and to see the various models available, see your local dealer or contact us direct we'll be glad to send our latest bulletin.

dieco
DIE SETS

For more data circle 521 on Postpaid Card

E. W. BLISS COMPANY
DIE SUPPLY DIVISION
Cleveland, Ohio

BREMIL
The IMPROVED Compound Lever Shears
ALL ALLOY
FULLY
GUARANTEED

Two Sizes
PORTABLE
No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{1}{4}$ " steel plate.
BREMIL MFG. CO.
1020 Holland St., Erie, Pa.

For more data circle 522 on Postpaid Card



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmertding, Pa.

For more data circle 523 on Postpaid Card

BETTER WAY TO CLEAN

DIES and individual
metal PARTS

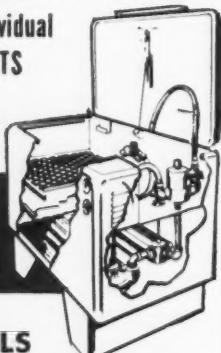
For

- * PRODUCTION
- * MAINTENANCE

MODEL

500

\$329⁰⁰



Get a

GRAYMILLS

CLEAN-O-MATIC Parts Washer

1. No heating, no vapor
2. Flush chips and dirt from metal parts with filtered solvent
3. Clean out blind holes and cavities
4. Do it thoroughly, fast and safely

Send for catalog and prices

152

GRAYMILLS CORP.

3707 N. Lincoln Ave.
Chicago 13, Ill.

For more data circle 524 on Postpaid Card

242 modern machine shop

new shop equipment . . .



Ty-Sa-Man 30 Horsepower Metal Chop Saw

for both production and maintenance work—producing clean, high speed cuts of heavy structural members, bar stock, test sections, forging blanks, extrusion blanks, high temperature alloys, die blanks, heavy cable, pipe and many other materials.

The saw offers: more powerful main motor (30 h.p.), sealed-bearing spindle, timing belt drive and a new dynamic suspension system that permits light, fingertip feed without the need of springs, counterweights or adjustments.

For more data circle 153 on Postpaid Card

★ modern machine shop ★

NEW STYLE SILICON RECTIFIER

The availability of new, smaller silicon a.c. to d.c. power rectifiers is announced by Syntron Co., 309 Lexington Ave., Homer City, Pa. The Style 30 Rectifiers, weighing only one-half ounce, are more compact for wider latitude in equipment design and for easier installation in smaller areas.

July, 1959

The complete diode, with an 11/16 inch hex stud base, has maximum height of 1 7/16 inches.

These diodes are a highly efficient rectification medium with very good electrical and mechanical characteristics, and they offer the advantage of economical long service, achieved through special construction. They are rated at 10 amperes average at 150 degrees C. ambient, and are available

with peak inverse voltages ranging from 50 to 400 volts, in 50 volt steps.

Their outer case is nickel plated so that it can withstand severe service without failure.

For more data circle 154 on Postpaid Card



Silicon Rectifier

Does Your Product Mark Look Like This...

AUTOMATIC MARK=1959

or This...?

AUTOMATIC MARK=1959

You Can Get a Perfect Mark
EVERY TIME with a
New Method Automatic Roll Marker

SO PRACTICAL! • It operates on ONE STATION* on your automatic just like other screw machine and lathe tools. *It advances! It marks the part! It clears it!*

- It eliminates costly secondary marking operations.

Hundreds of New Method Automatic Roll Markers are setting new standards every day in plants throughout the country by outstanding performance, long life, utility and dependability.

*Consult us regarding use of the NM marker with existing tooling where no station is available.

Write TODAY for new Catalog MA-59



SINCE 1931

NEW METHOD STEEL STAMPS, INC.

147 JOS. CAMPAU • DETROIT 7, MICHIGAN

For more data circle 525 on Postpaid Card

July, 1959

modern machine shop 243



Typical OD Automatic Roll Marker—Model 500-C.



Typical Radial End-face Automatic Roll Marker — Model 900-AC.



A Custom Dual-Purpose OD Automatic Cut-off Marker.

new shop equipment . . .

COOLANT FILTERS ARE AUTOMATICALLY SELF-CLEANING

A complete line of automatic pressure type filters for cleaning of cutting oils, coolants and lubricants, is announced by Olson Filtration Engineers,

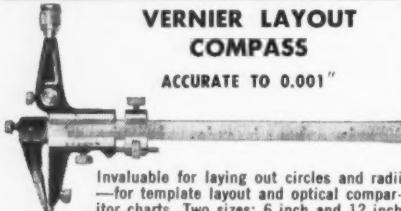
HOLES
1" TO 4" DIA. WITH ONLY 5 TOOLS
M-3 H.S.S. BLADES



Clark ADJUSTABLE
COUNTERBORES
P.O. BOX 990 BEVERLY HILLS, CALIFORNIA

For more data circle 526 on Postpaid Card

**VERNIER LAYOUT
COMPASS**
ACCURATE TO 0.001"



Invaluable for laying out circles and radii
—for template layout and optical comparator charts. Two sizes: 6 inch and 12 inch scales. Reads to 1/000 inch. Packed in wood case including Phono-needle points and scriber. Write for literature.

Dealer Inquiries Invited

TITAN TOOL SUPPLY CO.
1419 Hertel Ave. • Box B • Buffalo 16, New York
For more data circle 527 on Postpaid Card



Olson Continuous Flow Coolant Filter

5024 Section Ave., Cincinnati 12, Ohio. Eight models range in capacity from 600 to 10,000 gallons per hour. All are automatically self-cleaning. Olson Tubular Filters produce a continuous flow of clean filtrate, even during the periods when the filters are cleaning themselves. Filtration is accomplished by permanent tubular elements of Monel metal.

The filters rejuvenate themselves by backwashing, after which they are automatically precoated to reach full efficiency immediately.

These filters are said to regularly remove more than 95 percent by volume of suspended solids from

*You Need an Extra Hand Now
to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS



IN 11 SIZES—No. 6 to 1"
N.C. in all S.A.E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per-hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

HEIMANN MFG., CO. • URBANA, OHIO

For more data circle 528 on Postpaid Card

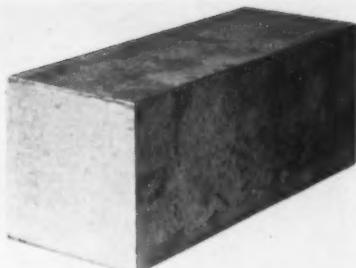
petroleum or water base fluids. When using the grinding wheel swarf as a precoat, chips, dirt, scale and other particles down to 3 micron size are all filtered out. If a filter-aid additive is used as a precoat, all particles down to $\frac{1}{2}$ micron in size can be filtered out. For more data circle 155 on Postpaid Card

★ modern machine shop ★

TOOL STEEL AVAILABLE IN NEW BAR SIZES

Darwin and Milner, Inc., 2345 St. Clair Ave., Cleveland 14, Ohio, announces that Mineor is now available in bar stock sizes of rounds from $\frac{1}{4}$ to $12\frac{1}{8}$ inches, flats $\frac{1}{4}$ by 1 to 5 by 6, squares $\frac{3}{8}$ to 6 and square billets 4 to 12 inches. The recently announced new bar stock size is the 6 inch square.

Mineor is an air-hardening steel which serves as an excellent substitute for higher cost high-carbon, high-chromium steels. It has many of the



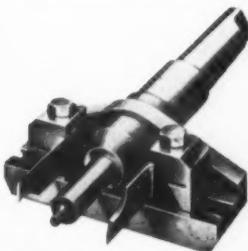
Mineor Air Hardening Tool Steel

desirable features of more expensive air-hardening steels and, in many applications, offers equally long life and productivity. Mineor is widely used in applications where easy machinability, non-deforming properties, and simple heat treatment are more important than extremely long life. Among its principal uses are stamping dies, gages, punches and shearing blades. Mineor is also widely used for

BOREMASTER

For Holes and Cores in One Operation

Bores a 6" hole in 3-1/4"
machine steel in 6 minutes,
a 5" hole in 1" boilerplate in 80 seconds!



- Rigid and Heavy-Duty
- Saves Time
- Saves Material (cores intact)
- Excellent Chip Load Distribution
- Easy Cutting
- 5 sizes for $1\frac{1}{2}$ " to $11\frac{3}{4}$ " dia. work to 8" depth
- With or Without Retractable Pilot

These advantages mean
HIGHER PROFITS FOR YOU!

FREE!

For illustrated
catalog, write today!



Sole U.S. Representative

KARL A. NEISE

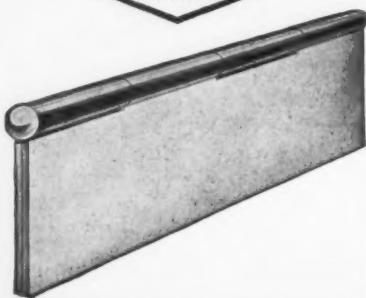
Dept. MM-79
404 4th Ave.
New York 16, N. Y.

**NEISE
MODERN TOOLS**

For more data circle 529 on Postpaid Card



AUTOM



CONTINUOUS HINGES

Manufactured by

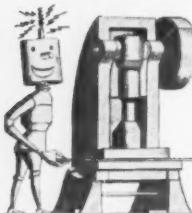
**AUTO MOULDING
& MFG. CO.**

WRITE FOR CATALOG

1114 E. 87TH ST.

CHICAGO 19

For more data circle 530 on Postpaid Card



let this
automatic
STOCK FEED STOP
cut your labor bill!



**DAHLSTROM
AUTOSTOP**
for punch press dies

Every stroke is a production stroke when your press is equipped with the amazingly simple Dahlstrom Autostop! It's been tested and proven in years of actual use. Adjustable to work with blanking, progressive or compound dies. Mounts on stripper plate in 15 minutes—handles sheet steel up to $\frac{1}{2}$ " x 6" or equivalent weight. Lots of 12 or more, \$1.50 each. State whether for compound or progressive dies. Write for complete line bulletin describing Autostop, Tap Guides and Tap Chucks.

\$1.75 each

- ★ SPEEDS PRODUCTION
- ★ CUTS WASTE
- ★ INCREASES PROFITS

BRANCH MFG. CO. 15 Olson Drive, North Branch, Minn.

For more data circle 531 on Postpaid Card

246 modern machine shop

new shop equipment . . .

cutting tools such as reamers, taps and broaches.

For more data circle 156 on Postpaid Card

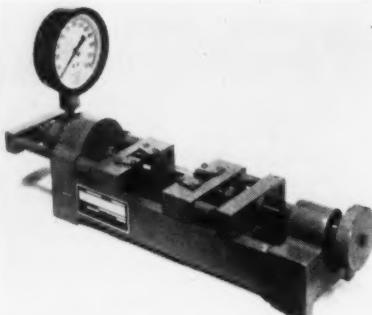
★ modern machine shop ★

PORTABLE TENSILE TESTERS

A family of portable tensile testers has been developed by Steel City Testing Machines, Inc., 8823 Lyndon Ave., Detroit 38, Mich., for making tensile tests on round or flat specimens anywhere. These testers are not dependent on outside power of any kind, since the load is applied manually by rotating a knurled knob. They can be carried easily because the net weight of each is only 36 pounds. The applied load is measured by a trapped-oil system.

Simple but rugged design insures accurate and maintenance-free operation. Tests can be accomplished quickly by even unskilled operators.

All testers are designated as Model THM-, with the capacity of the specific unit added after the dash (Model THM-600 is illustrated). They are available in capacities from 100 to 1,000 pounds, with the applied load indicated on a $4\frac{1}{4}$ inch diameter gage. For more data circle 157 on Postpaid Card



The Steel City Portable Tensile Tester

July, 1959

COOLANT UNIT INCREASES PRODUCTION AND LENGTHENS TOOL LIFE

A neat, compact, low cost coolant unit especially designed for small precision drilling, tapping, milling, sawing and grinding operations, is announced by Trico Fuse Mfg. Co., Milwaukee, Wis. Type J Trico-Mist is equipped with a 2 foot Neoprene coolant line and mist generating nozzle. A mounting stud is provided for easy installation.

Dual valves are provided, one with red knob to control air and the other to control flow of liquid coolant dispensed at the tip of the mist generating nozzle.

The unit operates on shop air line pressure of 50 to 125 pounds. Because mist is achieved by an atomizing principle, there is no air pressure in the reinforced



The Trico-Mist Type J Coolant Unit

shatterproof 8 ounce capacity plastic reservoir at any time. Coolant supply is always visible.

For more data circle 158 on Postpaid Card

★ modern machine shop ★

AUTOMATIC FORGING MACHINE

The Hill Acme Co., 1203 West 65th St., Cleveland 2, Ohio, has developed a fully automatic forging machine,

You can't beat Sanding with a MITY-MIDGET LIGHTWEIGHT, FAST, DEPENDABLE

Weighing only 4 pounds . . . yet so powerful you can't stall it by standing on it . . . this Air Driven, Orbital Action Sander gives a perfect finish, quickly and easily.



**MODEL
400**

See how "Mity-Midget" can save you time and money. Write for a complete catalog today.

NATIONAL-DETROIT, INC., ROCKFORD, ILLINOIS

For more data circle 532 on Postpaid Card

modern machine shop 247

Every TOOL ROOM NEEDS THIS BIG REID CATALOG

It's Free!

Send for this 78 page catalog, listing scores of needed tool room items.



STRAIGHT

Holes and faces of hubs are true to rim. Handles and rims are polished to high lustre. Many sizes. Low prices.



COUNTER BALANCED

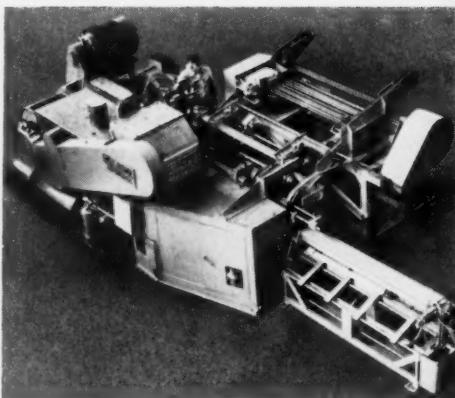
C. I. HAND WHEELS

Made straight or dished in both solid web or spoked counter balanced types. Fine grain cast iron. Center

REID TOOL SUPPLY CO.
MUSKEGON HEIGHTS, MICHIGAN

For more data circle 533 on Postpaid Card

new shop equipment . . .



Hill Acme Automatic Forging Machine

integrated with an induction heater, as shown in the illustration, which is producing $\frac{5}{8}$ and $\frac{3}{4}$ inch mine roof bolts in lengths from 12 to 72 inches at the rate of 45 pieces per minute in sustained operation. The rods, threaded at one end, are loaded into the feeding rack where an index feed, chain driven, positions them for proper spacing through the induction furnace.

As the rod ends are heated they are delivered, at the proper timing cycle, to the forging machine by a roller chain feed where they are gauged for length, picked up by fingers and passed progressively through the four position die. The finished forgings are discharged from the back of the machine by means of a separately driven conveyor, arranged for both right and left hand discharge.

For more data circle 159 on Postpaid Card

★ modern machine shop ★

ANGLE DRILLING AND MILLING ATTACHMENTS

Versatile angle attachments for power hand tools which permit

Peaslee

**PRECISION
MINIATURE**

Actual Size

DOWEL PINS

We specialize in precision, stainless steel Pins, Dowels, Shafts. Quantity production of standard sizes includes miniature, instrument type pins, as small as .020 dia. For prompt quotations on your blueprints . . .

WRITE TODAY TO

THE PEASLEE METAL PRODUCTS INC.
468 Tolland St. • East Hartford 8, Conn.
For more data circle 534 on Postpaid Card



(Above) Drexler Versatile Angle Attachments
(below) exploded view of same

"around the corner" precision drilling, burring, rotary filing, grinding, polishing, high speed nut setting and screw driving at 45, 90 or inverted 45 degree angles, are available from Drexler Division, Monument Eng. Co., 1625 Bellefontaine St., Indianapolis, Ind.

Attachments are available with either ball or needle bearings. All of the Drexler attachments are manufactured with all gears integral with their respective alloy steel shafts, properly heat-treated, ground and lapped, to

provide greater life at higher r.p.m. Drexler attachments have small housings—some units permit operation through a 1 $\frac{1}{8}$ inch hole, due to an anti-frictional bearing construction and the positive location of a hardened alloy steel ball, which takes cutting tool thrust loads and assures proper meshing of gears at all times.

For more data circle 160 on Postpaid Card

Universal

"FULL-FLO"

COOLANT NOZZLES

with AERATOR

Ask for IPB-Sec. 2A Bulletin

Quality... ALL METAL FLEXIBLE HOSE PRODUCTS

UNIVERSAL METAL HOSE CO.

2113 South Kedzie Avenue, Chicago 23, Illinois

For more data circle 535 on Postpaid Card

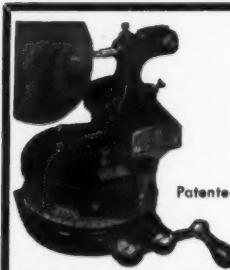
CAM MILLING JIG BORING

A SPECIALIZED CAM MILLING SERVICE.
JIG BORING
...SPOT WELDING
...CONTRACT PRODUCTION
EXPERIMENTAL DEVELOPMENT

CAM CALCULATING SERVICE

EISLER ENGINEERING CO., INC.
734 S. 13TH ST., NEWARK 3, N. J.

For more data circle 536 on Postpaid Card



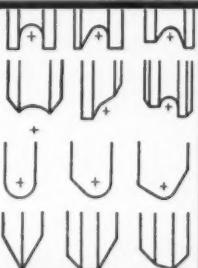
WHY WASTE TIME?

Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

Write for Price and Folder.

REPRESENTATIVES WANTED
IN SOME AREAS

JEON MANUFACTURING CO.
P. O. BOX 6750 WASHINGTON 20, D. C.



For more data circle 537 on Postpaid Card

new shop equipment . . .

LASSY WORKHOLDERS



Lassy Work Holders maintain repetitive work alignment and accuracy.



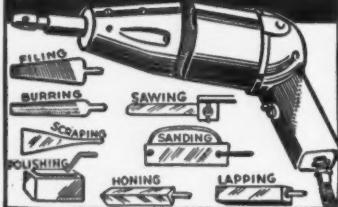
**Write for New Illustrated Catalog
on Time Saving Devices**

LASSY TOOL CO.
PLAINVILLE, CONNECTICUT

For more data circle 538 on Postpaid Card

STOP . . . HAND WORK

ONE TOOL - UNLIMITED USES



Use these Handy PORTABLE ELECTRIC RECIPROCATING TOOLS for Greater Production, Better, More Uniform Work — All with less Operator Fatigue. Fixed strokes are $\frac{1}{4}$ " or $\frac{3}{8}$ " long. Operate on 110 Volts AC-DC. Deliver 1000 PUSH-PULL strokes per minute. Try one of these tools on your next job.

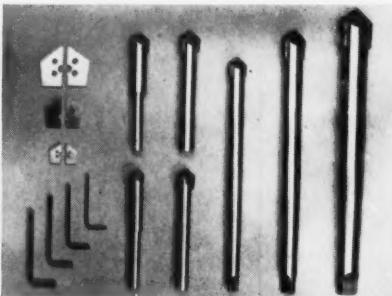
Send for Descriptive Literature.

ACME TOOL CORP.

73 W. Broadway • New York 7, N. Y.

For more data circle 539 on Postpaid Card

250 modern machine shop



The Trocki Ball Bearing Adjustable Drills

ADJUSTABLE DRILL

Erie Precision Products Co., 1346 East Twelfth St., Erie, Pa., announces the Trocki Adjustable Drill. Its design is based upon the principle of the ball bearing and its races, a combination of precision.

The tool has two moveable blades, whose point is the center of arcs of two ball bearing grooves in the adapter. Blades have two holes to retain bearings, which control blades as they are swung in and out to cut different diameters, leaving drill points always on center. Adjustment is made by loosening clamping screws and setting spreading screw to size desired.

Blade changing is made by loosening clamping cap screw, removing blades and inserting next size.

This ball bearing adjustable drill can drill or bore holes of different sizes in solid steel. It can drill a hole from any angle, on any rough surface without pilot or bushing.

For more data circle 161 on Postpaid Card

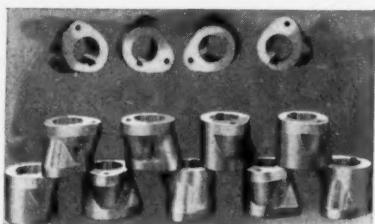
★ modern machine shop ★

MAGNETIC ANGLE IRON

A magnetic angle iron, developed to speed and simplify layout and inspec-

July, 1959

We'll make the cams you need



Rowbottom for Cams

Investigate!

If you need cams in any type... box, barrel, side or cams hardened and ground... or rotary profiling service... get the benefit of Rowbottom's long, specialized experience and complete service. We'll produce your cams or furnish the machines for making them. All types in any quantity. Send us your specifications.

THE ROWBOTTOM MACHINE CO.
P. O. Box 4097, Waterbury, Conn.

For more data circle 540 on Postpaid Card



SPEL MACO "SPOTTERS"

A matched set of transfer punches
for toolmakers, machinists and tool cribs

Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for
long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes $\frac{3}{16}$ " to $\frac{1}{2}$ ", by
 $\frac{1}{64}$ "—plus handy $\frac{1}{2}$ " size. Length 4 $\frac{1}{8}$ ". ONLY \$17.90.
Single sizes available

R. L. SPELMAN CO. • URBANA, OHIO

For more data circle 541 on Postpaid Card

HELIOS PRECISION DIAL CALIPERS

Guaranteed accuracy .001"

ILLUSTRATION SHOWING

MODEL NO. UR 68E

SIZES 6", 8", 10"

6" - \$28.60

Models Available in
HIGH CHROME and
STAINLESS STEEL

SIMPLE - FAST -
ACCURATE READINGS -
NO EYE STRAIN

Ask for literature on other Helios
Calipers, Vernier and Dial, also Helios
Parallels, Hole Gages, Telescope Gages,
Radius Gages.

Helios

KARL A. NEISE
Dept. MM-79, 404 4th Ave.,
New York 16, N. Y.

NEISE
MODERN TOOLS

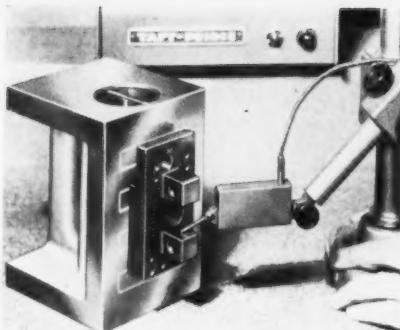
For more data circle 542 on Postpaid Card

new shop equipment . . .

tion, is announced by Taft-Peirce Mfg. Co., Woonsocket, R. I. Designated as No. 9195, it combines the advantages of a universal right angle iron with a magnetic chuck to eliminate the lost time and inconvenience of work clamping. The outstanding feature is a mag-

MORE INFORMATION?

For additional information on any product mentioned in this issue, please use the READER SERVICE CARDS opposite Pages 32 and 284.



Taft-Peirce Model 9195 Magnetic Angle Iron

netic face plate which can be quickly energized by a simple 90 degree turn of a recessed control bar, one of which is located on each end face. By turning this control bar 25 degrees, a special "fringe" magnetic setting is

CUT your Cutting Costs with KELLER POWER HACKSAWS

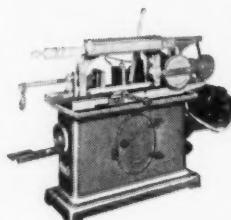


JEFFERSON "601"
With motor, switch, wired, ready to go **\$79.00**

KELLER No. 5 HY-DUTY 10½" x 9", Wet Cut.

A fast cutting, big capacity saw designed for continuous or intermittent duty. Features include a built-in coolant tank and pump, foot lift to saw frame, adjustable saw pressure, automatic lift on backstroke and many others.

Choose from 10 KELLER Models in 5 sizes, wet or dry cut.



Ask your KELLER Dealer
or write for descriptive
Bulletin 257 TODAY

Sales Service Mfg. Co.
2361 University Ave. • St. Paul 14A, Minnesota

For more data circle 544 on Postpaid Card

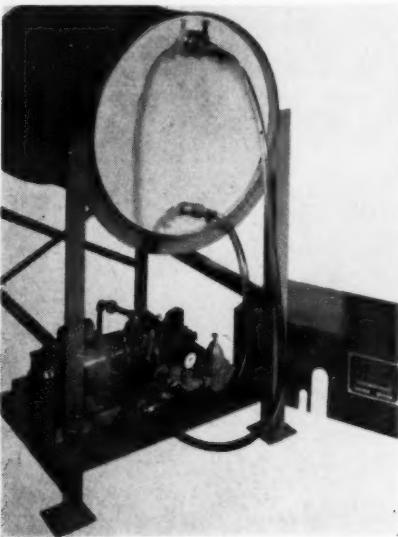
produced which allows the workpiece to be easily adjusted by hand to the final location, before full holding power is applied by a complete 90 degree turn. All work is held firmly in place for measuring, scribing or indicating. For more data circle 162 on Postpaid Card

★ modern machine shop ★

STATIONARY WATER SOLUBLE COOLANT BLENDER DISPENSER

A stationary coolant blender, capable of dispensing varying mixes of water soluble coolants is announced by M. J. French Co., Inc., P.O. Box 3823, Brighton Station, Rochester 10, N. Y.

This rugged, maintenance-free blender employs a method of metering water soluble coolant material at variable rate of flow into a constant flow of water. The ratio of coolant material to water is infinitely variable between the ratios of 10:1 and 100:1. Unit dispenses at a rate of 10 g.p.m. One simple control handle is all that is



Water Soluble Coolant Blender Dispenser

July, 1959

Another

VICTOR VALUE



Top Quality
Lowest Prices

Our Special Import . . .

DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order today—Immediate
Shipment From Stock!

VICTOR

MACHINERY EXCHANGE, INC.
Dealers in Tool Room Equipment

Dept. B, 251 Centre St.

Tel.: CANal 6-5575, New York 13, N. Y.

For more data circle 543 on Postpaid Card

modern machine shop 253

**GET UP TO 600%
INCREASE
IN STOCK REMOVAL RATE**



GRIND AND LAP at the same time. Get lapping accuracy at grinding prices. Obtain finishes of 1 RMS; flatness and parallelism to 2 millionths of an inch . . . with metals, plastics and ceramics.

SPEEDLAP is a "lap-grinding" unit which uses a non-chargeable lap plate, also higher lapping pressures, to give greater and faster penetration.

Ask for cost and production estimates based on samples of your work. Job lapping services also available.



ABRADING SYSTEMS COMPANY
8020 NORTH MONTICELLO AVENUE
SKOKIE, ILLINOIS

For more data circle 545 on Postpaid Card

254 modern machine shop

new shop equipment . . .

required to give exactly the correct mixture for each operation. Scale is calibrated at several popular ratios. Scale accuracy is 5 percent.

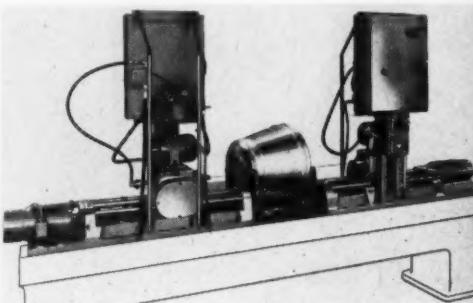
This unit can be used primarily in central make-up tanks to maintain liquid level and proper ratio of water to coolant; also for use in departments where machine tool operators maintain their own coolants.

For more data circle 163 on Postpaid Card

★ modern machine shop ★

**UNIT ASSURES ACCURACY
IN DEEP HOLE DRILLING
OPERATIONS**

The Model 2400-A Drill Unit, specially engineered for continuous high accuracy deep hole drilling of small diameter blind or through holes, 3/32 to 5/8 inch, has been developed by 20th Century Machine Co., 6070 East 18 Mile Rd., Utica, Mich. Principle feature is positive synchronization of spindle speeds with feeds at all times. This is accomplished by a gear and worm arrangement between the spindle and feed which can be adjusted by pick-off gears. This eliminates the tendency toward speed up or slow



Two 20th Century Model 2400-A Drill Units mounted in opposing positions and operating simultaneously on a single workpiece

July, 1959

down, however slight, which is encountered with air, hydraulic or other secondary power sources.

For more data circle 164 on Postpaid Card

★ modern machine shop ★

MILLING CUTTER USES THROW AWAY INSERTS

A milling cutter, designed to use throw away type, indexable cemented carbide insert blades is reported to reduce milling time, through tool changing and setup, as much as 50 percent, and completely eliminate the necessity of regrinding the blades, according to Super Tool Co., Dept. 328, 21650 Hoover Rd., Detroit 13, Mich. The cutter is designed to insure automatic precision insert blade holding and support, yet allows each insert to be easily indexed to a new cutting edge in about 30 seconds.

Each insert sets in a precision ground pocket of the cutter body. This means greater rigidity is provided to



New Milling Cutter

July, 1959

each blade since greater insert contact against the cutter body is made. Furthermore, when indexing, accurate resetting of each blade is assured, and the blades are prevented from being pulled out of the cutter body when heavy cuts are being made.

Depending on design, the carbide inserts are manufactured to provide 4 to 8 cutting surfaces, and are made in grades for milling cast iron or steel. For more data circle 165 on Postpaid Card

Proven BEST!



Mistic Mist
mist coolant
GENERATORS

More than 28,000 in daily use!

500%

increase in tool life! Mistic Mist cools the tool and not the chips! Heat is absorbed by the rapid expansion of compressed air and evaporation of fine mist which produces maximum cooling results.

200%

greater production! Tools stay cooler . . . cut cleaner . . . at greater speeds. Better finishes, too! Small diameter nozzle delivers cooling mist closer to the cutting action. No mess . . . no drip or splash pans needed.

Available in one, two or five gallon units with single or multiple outlets . . . or central systems for complete shop installations. Have it demonstrated in your shop without obligation. Your Dealer's name and literature will be sent on request.

AETNA MANUFACTURING CO.

180 S. York Rd.

Bensenville, Ill. • POrter 6-3810

For more data circle 546 on Postpaid Card

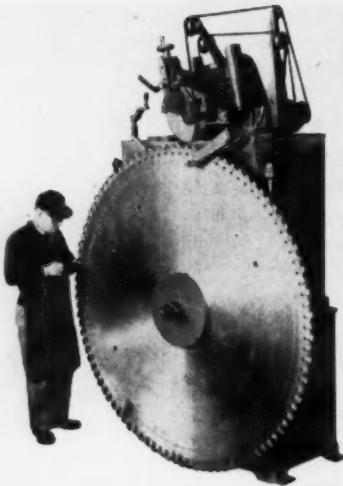
modern machine shop 255

new shop equipment . . .

METAL SAW SHARPENING MACHINE

Hanchett Mfg. Co., 906 North State St., Big Rapids, Mich., announces the No. 1184 Heavy Duty Metal Saw Sharpening Machine which is designed for all types of metal cutting saws up to 84 inches in diameter. It features extremely heavy duty construction, with ball or roller bearings throughout.

The saw is carried on a heavy duty roller bearing that contributes to the accuracy and fine finish offered by this large capacity machine. This heavy duty grinder is designed for sharpening both hot or cold metal cutting saws and has provision for automatically forming high and low teeth, and for alternately beveling the tops of the high saw teeth. Saw teeth are generated by cam control and the mechanism is adjustable to a wide range of both tooth spacings and depths of saw teeth.



Hanchett No. 1184 Saw Sharpening Machine

The length of stroke of the feeding mechanism and the stroke of the grind-

COMMANDER TAPPERS

**LEAD-MATIC
TAPPER**



Lead Screw Tapper
Range: 0-80 to $\frac{1}{4}$ "-16

**PNEU-MATIC
TAPPER**



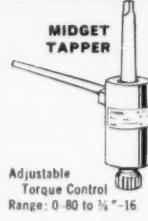
High Production,
Air Operated
Range: 0-80 to $\frac{1}{4}$ "-16

MULTI-TAPPER



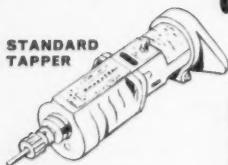
taps 2 to 15
holes at 1 stroke.
Adjustable
hole pattern

**MIDGET
TAPPER**



Adjustable
Torque Control
Range: 0-80 to $\frac{1}{4}$ "-16

**STANDARD
TAPPER**



Pressure Sensitive Drive
Range: 0-80 to 10-24

a Type and Size for Every Job!

Commander Tappers are made in 10 models — each designed to handle tapping jobs over a wide range. From the Commander Tapper line, you can select the right unit to give you the exact performance your job requires. Whichever Commander Tapper you select, you will get unequalled performance and tapping economy. Sold and serviced by drilling and tapping specialists. Write for the Commander Production Tool Catalog and name of nearest Distributor.



Commander MFG. CO. 4224 W. KINZIE STREET
CHICAGO 24, ILLINOIS

For more data circle 547 on Postpaid Card

ing head are adjustable by handwheel controls. The saw is fed by an index plate drive. The grinding wheel is 12 inches in diameter and is driven by a 1 h.p. electric motor.

For more data circle 166 on Postpaid Card

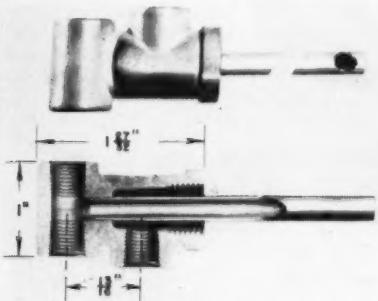
★ modern machine shop ★

FOUNTAIN WATER JUNCTIONS COOL WHERE WATER LINES CANNOT BE USED

Fountain water junctions are available for water cooling of casting dies and moulding equipment. Manufactured by Advance Products Corp., Benton Harbor, Mich., these units are designed for spot and regular cooling applications in plastic molds, die casting dies and cores where space for drilling of conventional water lines is limited due to ejector pins, core slides and cores. Advance fountain water junctions are zinc die cast and tapped for $\frac{1}{4}$ standard pipe nipple. Each inlet and outlet is tapped for $\frac{1}{8}$ standard pipe. A 14 inch length of $\frac{1}{8}$ rigid brass tube is furnished with each junction. The tube is threaded at one end to screw into the body.

These units are available in three types and sizes, suitable for most requirements.

For more data circle 167 on Postpaid Card



The Advance Fountain Water Junctions

July, 1959

7 REASONS WHY FLYNN BORING HEADS ARE MOST USED



LEADING NAME IN BORING HEADS FOR 40 YEARS 19 MODELS Write for catalog

FLYNN MANUFACTURING CO.
111 HOWARD AVENUE • DETROIT 20, MICH.

For more data circle 548 on Postpaid Card

RIVETERS . . .

GRANT

PIONEERS
and
PACEMAKERS
in their
line



—head rivets from smallest to $\frac{3}{4}$ " diameter cold steel, either by NOISELESS SPINNING or VIBRATING HAMMER method — fast, economically — types include Vertical and Horizontal Spindles, foot-power or automatic.

Free estimates of your work.
Write for catalog today.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport 5, Conn.

For more data circle 549 on Postpaid Card

modern machine shop 257

new shop equipment . . .



Powermatic Model 86 Band Sawing Machine

20 INCH METAL CUTTING BAND SAW

Powermatic Machine Co., McMinnville, Tenn., has introduced a 20 inch metal cutting band saw, the Model 86. The most important feature of this saw is the Quik-Set speed selector, allowing instant dial adjustment of all speeds from 38 to 4,100 s.f.m.

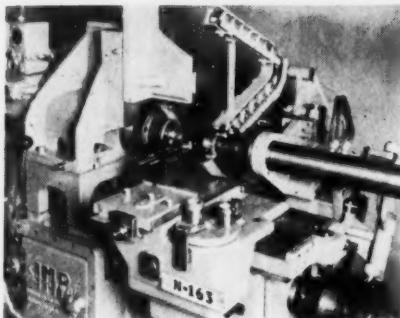
The accurately machined table tilts 45 degrees right and 15 degrees left on a heavy duty single action trunnion, which affords maximum rigidity. A choice of hardened block guide set, ball bearing guide set or angle-insert blade guides is available.

For more data circle 168 on Postpaid Card

★ modern machine shop ★

LATHE FEATURES AUTOMATIC LOADER

Elimination of operator fatigue, acceleration of output and improved



Seneca Falls IMP Lo-Swing Automatic Lathe

quality control are possible by using an automatic loader on the IMP Automatic Lathe, manufactured by Seneca Falls Machine Co., 17 Fyfe Building, Seneca Falls, New York.

The automatic loader feeds the heavy couplings into a cradle, where they are picked up by an injector head and chucked into an air operated chuck. The machine turns the outside diameter, forms the radius on the flange and chamfers the bore on the coupling. The finished piece is automatically ejected, picked up by a safety finger and dropped on an evacuation chute.

The IMP and the automatic loader are designed for operations demanding high spindle speeds, fine finishes and extreme accuracy. It is also suitable for turning heavier work such as small pistons, bushings and gear blanks.

For more data circle 169 on Postpaid Card

★ modern machine shop ★

MACHINE TOOLS FOR ELECTRONIC THREE DIMENSIONAL MACHINING

The Elox Corp., of Michigan, 1830 North Stephenson Hwy., Troy, Mich., announces the RP-100 Series of electrical discharge machine tools. Designed for the shop where precision



Series RP-100 Electrical Discharge Machine

is essential, this rugged machine tool is being used to produce extrusion

dies, powdered metal dies, cold heading dies, blanking dies, multiple pierce dies and three dimensional cavities.

The series features: electrical mechanical power feed or hydraulic power feed; precision locating devices and precision electrode holding devices; work table surface of 7 by 17 or 12 by 18 inches; the 3 $\frac{3}{4}$ inch diameter quill travels 10 inches vertically; a complete dielectric oil system.

For more data circle 170 on Postpaid Card

★ modern machine shop ★

CONSTANT-FLOW PORTABLE COOLING UNIT

Blue M Electric Co., 138th and Chatham St., Blue Island, Illinois, announces a portable cooling unit designed on a new principle which permits rapid cycling, extremely close temperature control and longer compressor and trigger control life. Use of thermostatic expansion valve and

HEATS FAST SAVES TIME

johnson

NUMBER 142 HEAT TREATING FURNACE

Powerful burners in this efficient furnace get heat up to the 1300°-2350° F. range in minutes. Temperatures accurately and quickly regulated. Does fast job with high speed and carbon steels. Ratchet-operated door opens upward. High temperature, refractory-lined firebox is 7" by 13" by 16 $\frac{1}{2}$ ". 200,000 BTUs per hour. Carbofrax hearth, G.E. Motor and Johnson Blower included, F.O.B. Factory \$374.00

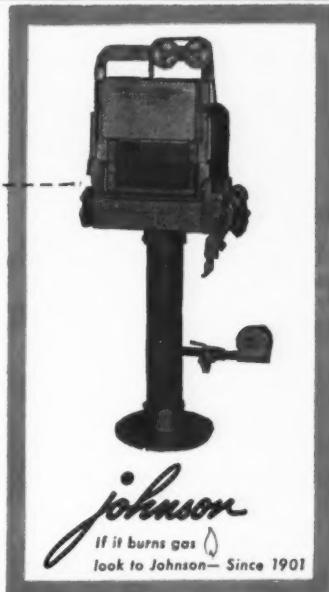
Write today for free Johnson Catalog

JOHNSON GAS APPLIANCE COMPANY
571 E Avenue NW, Cedar Rapids, Iowa

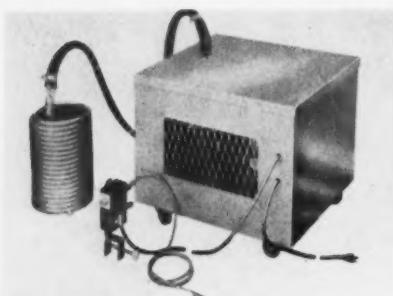
For more data circle 550 on Postpaid Card

July, 1959

modern machine shop 259



new shop equipment . . .



Blue M Constant-Flow Portable Cooling Unit

dryer-strainer assure a high quality, reliable system.

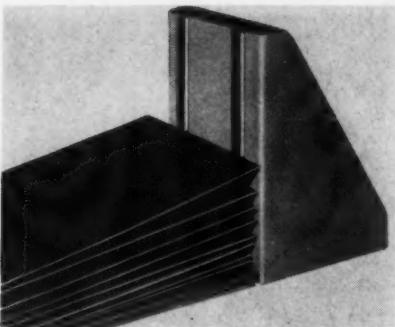
Temperature ranges: Ambient to plus 1.1 degree C. (34 degrees F.) or minus 23 degrees C. to plus 5 degrees C. (41 degrees F.). Controls within plus or minus 0.15 degree Centigrade. **For more data circle 171 on Postpaid Card**

★ modern machine shop ★

MAGNETIC SHEET FANNER

A new and more powerful permanent magnet fanner will make the handling of sheet steel both faster and safer, according to Stearns Magnetic Products, 635 South 28th St., Milwaukee 46, Wisconsin.

The sheet fanner employs a recently developed efficient oriented ceramic magnet material, Indox V, which



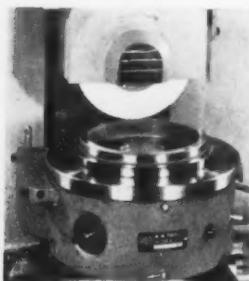
Stearns Indox V Magnetic Sheet Fanner

Stearns has standardized upon because of its stronger and more uniform magnetic field and high resistance to demagnetizing influences.

When steel sheets are stacked against the fanner, a magnetic field is induced in the sheets, making them tend to repel each other and fan out automatically. Handlers may remove single sheets easily and quickly and with less danger of injury to hands.

Because of the unique flux pattern of the Indox V magnet, Stearns engineers claim more positive separation of sheets under particularly difficult conditions—dirty, oily sheets that tend to be sticky, for example.

The Indox V sheet fanner is available in three sizes which, individually or in combination, will meet fanning requirements of all sheet stock sizes. **For more data circle 172 on Postpaid Card**



**NEW WAY TO GRIND!
ROTO-GRIND**

—a precision grinding fixture for surface grinders and jig grinders.

- Save Time — Save Money
- Grind Dies, Molds & Special Rings
- Precision grinding as well as rough work
- Extreme accuracy — less than 20 millionths on many parts
- Variable speed — forward and reverse
- Sets up vertically for checking and ID-OD grinding
- Disengage clutch for hand work or indicating

WRITE Today for literature!

M&M TOOL & MANUFACTURING CO.
1123 E. THIRD ST. • DAYTON 2, OHIO

For more data circle 551 on Postpaid Card

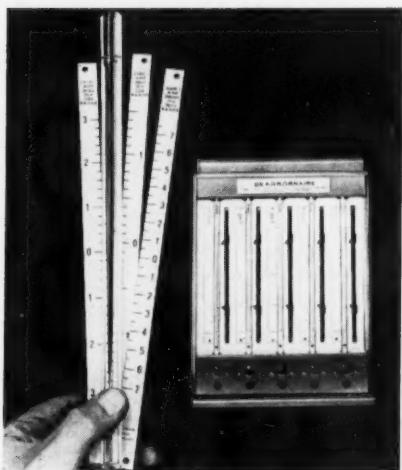
GLASS TUBE FOR COLUMN TYPE INSTRUMENTS

Dearborn Gage Co., Air Gage Division, 32330 Ford Rd., Garden City, Mich., has developed a new glass tube for column type instruments which can be used for three standard amplifications—1,250:1, 2,500:1 and 5,000:1.

This means that, instead of having to replace anywhere from two to six parts every time you want to convert an instrument from one amplification to another, all that's required now is a change of calibrated scales only. It also eliminates the need of maintaining excessive inventories of single-amplification components and replacement parts.

Key feature of this Multi-Amp Tube is its characterized internal configuration, which incorporates a predetermined and precisely controlled variant rate of taper. The unique tube design creates an air circuit that is linear over the full extent of the calibrated scale, thus assuring finer accuracy and reliability of measured readings.

For more data circle 173 on Postpaid Card



Multi-Amp Tube for air gage instruments

July, 1959



MORE REACH for the Tapping Head

You can machine tap in deep holes and awkward locations with ordinary, standard taps plus Walton's NEW "Style B" Extensions. Single units fit together to make a rigid, closely aligned assembly, for either machine or hand tapping operations.

Adaptable to all standard taps from #0 to $\frac{1}{2}$ ". A complete, boxed set of 9 tools lengthens taps from 8" to $28\frac{1}{4}$ ". Eliminates the need and cost of expensive, "long" taps.

Write for Specifications and Data Sheet #10. These new extensions will be sent for 30 days Free Trial, if requested.



For more data circle 552 on Postpaid Card

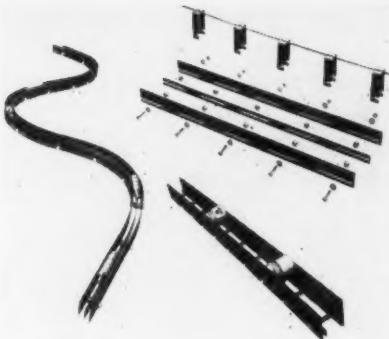
modern machine shop 261

new shop equipment . . .

FLEXIBLE CHUTING FOR GRAVITY FED CONTINUOUS PARTS MOVEMENT

A development in chuting for gravity-feed rolling or sliding part conveyance is announced by F. Jos. Lamb Co., 5663 East Nine Mile Rd., Detroit 34, Mich. Called FabriFlex, it consists of spring steel side and ride rails that provide structural strength with extreme flexibility of installation and versatility of part application. No shop fabrication is necessary, as bolted construction eliminates the need for special design chuting and permits fast on-site assembly from standard components to suit any part configuration, plant layout or process sequence.

Installation requires no special skills or tools. Plant layout drawings and precise measurements are not required, as FabriFlex can be routed around building obstructions and cut to length



FabriFlex Chuting developed by F. Jos. Lamb

at the time of installation. FabriFlex cannot be obsoleted; rearrangement of rails and spacers normally will accommodate part design changes or new parts. Process sequence changes require only rerouting the assembled chuting. FabriFlex can be used with fixed oscillating or reciprocating feed installations.

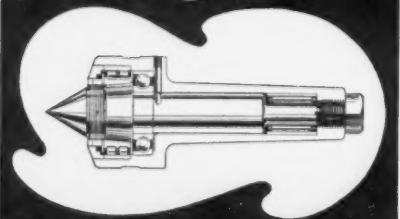
For more data circle 174 on Postpaid Card

★ modern machine shop ★

FLOOR MODEL WET BLAST HONER

Tobin-Arp Mfg. Co., 6400 Penn Ave., South, Minneapolis 23, Minn., has added a floor model wet blaster to its Tamco line of equipment. Called Liqui-Breez Model LB-1002, the wet blaster is designed to perform the following operations—honing, cleaning, deburring and blending. The machine is fast and efficient for all four of these operations. In honing, it is claimed that the cutting efficiency

NIELSEN
Heavy Duty
Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

Write for catalog
M on live centers

NIELSEN, INC. LAWTON, MICHIGAN

For more data circle 553 on Postpaid Card



**Tamco Liqui-Breez
Wet Blast Honer**

of high speed steel and tungsten-carbide cutting tools can be increased as much as 500 percent. In cleaning, the Liqui-Breez removes all minute particles and foreign matter from metal surfaces. In deburring, this method is highly successful in removing both loose and tight burrs. In blending, directional lines caused by machining and grinding can be easily removed, preparing surfaces for plating or painting.

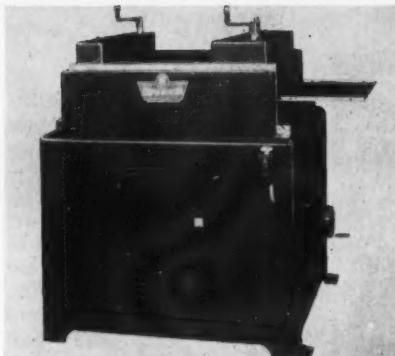
For more data circle 175 on Postpaid Card

★ modern machine shop ★

20 INCH PARTS STRAIGHTENER

Cooper Weymouth, Inc., 603 Honey-spot Rd., Stratford, Conn., announces a high accuracy, high production 20 inch parts straightener.

Of particular interest to manufacturers, assemblers and finishers of flat stampings, the straightener is designed to reduce expensive hand-fitting in assembling such products as office



Cooper Weymouth 20 Inch Parts Straightener

machines and appliances, as well as provide improved performance for functional parts and better appearance for painted or plated items.

Straighteners are available in self-contained, bench height cabinet and portable models.

For more data circle 176 on Postpaid Card



PRECISION TOOL AND DIE SURFACE GRINDING MACHINE

MADE IN ENGLAND



- Designed specifically for the high production of really flat surfaces to close limits at high rates with fine finishes.
- Surface finish in micro inches on suitable material.
- Lubrication to all slides is automatically carried out by one shot system ensuring regulated supply under pressure.
- 3 H. P. main motor with swing adjustment for belt tension.
- Push button controls with rapid power elevation switch.

Write for 16-page illustrated folder.
Sales territories open.

THE H & R SUPPLY COMPANY

P. O. BOX 104

CINCINNATI 31, OHIO

For more data circle 554 on Postpaid Card

new shop equipment . . .

RETAINING RING KIT

Packaged Merchandise Co., 3065 West 117th St., Cleveland 11, Ohio,

now offers an improved version of its retaining ring "Econokit." The retaining rings are now packed in a 12 by 12 shockproof, plastic case that tells at a glance sizes and types of rings. The kit contains 400 cadmium plated Truarc retaining rings in an assortment of 84 sizes. Rings are placed in a slot designed to take that size retaining ring. Sizes range from $\frac{1}{4}$ to $2\frac{1}{2}$ inches in the three most popular Truarc series of internal, external and universal crescent ring designs.

For more data circle 177 on Postpaid Card

Retaining Ring Econokit



ment of 84 sizes. Rings are placed in a slot designed to take that size retaining ring. Sizes range from $\frac{1}{4}$ to $2\frac{1}{2}$ inches in the three most popular Truarc series of internal, external and universal crescent ring designs.

For more data circle 177 on Postpaid Card

★ modern machine shop ★

RADIAL BEARINGS

Deep groove radial bearings for applications up to 900 degrees F. are carried in stock in three R-series sizes by Industrial Tectonics, Inc., 3686 Jackson Rd., Ann Arbor, Mich. (R-2: bore 0.1250 inch, o.d. 0.3750 inch); (R-3: bore 0.1875 inch, o.d. 0.5000 inch); (R-4: bore 0.2500 inch, o.d. 0.6250 inch). The bearings are manufactured to ABEC-5 tolerances.

Materials for balls, races and retainers is high speed tool steel. Retainers are machined and of snap-in type construction.

For more data circle 178 on Postpaid Card



High Temp Bearing

264 modern machine shop

POCKET-SIZE HARDNESS TESTER

The Sklero Hardness Tester, a portable unit for use by toolmakers, foremen, superintendents, metallurgists and engineers, is announced by Precise Products Corp., Racine, Wis. The instrument can be carried in a shirt pocket and enables the user to make on-the-spot hardness readings without moving the test piece to large stationary test equipment.

Operating on the rebound principle, it provides consistently accurate readings to within plus or minus of 1 point Rockwell C. Test readings can be converted to Rockwell Shore or Brinell by the special conversion table that is provided.

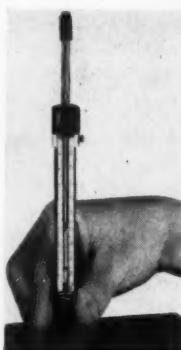
Sklero operation is extremely simple and fast. The instrument is merely placed in a vertical position on the article to be tested. The rebounding bar, which carries a hardened steel ball point, is raised and, when released, rebounds to a point corresponding to the hardness of the object and is locked into position for reading.

For more data circle 179 on Postpaid Card

★ modern machine shop ★

PROTECTIVE COATING IS REMOVABLE

Development of a solvent or alkali removable coating for in-shop protection of metallic and non-metallic surfaces during storage, forming and fabricating operations is announced by Turco Products, Inc., 6135 South Central Ave., Los Angeles 1, Calif. Turco



Sklero Hardness Tester

July, 1959

Fabrifilm is said to offer the protection available only in the past by use of zinc chromate primer, without the difficulties of removal.

Expressly designed for use in mass production, Turco Fabrifilm is applied by spray upon receipt of raw stock. The abrasion-resistant coating is allowed to remain on the surface during forming and fabrication, and then is easily and completely removed from the surface during subsequent cleaning. Since the material is quickly applied, easily removed and requires no special drying procedures, no man hours are utilized in time-consuming and costly extra operations.

The standard version of Turco Fabrifilm is colored blue. Turco Fabrifilm Natural is also available and can be dyed to any color code requirement. For more data circle 180 on Postpaid Card

★ modern machine shop ★

INSTRUMENT SAVES TIME IN CHECKING DEPTHS

Besly-Welles Corp., South Beloit, Ill., announces a visual, depth-indicating micrometer that eliminates many manual operations previously needed to check depth dimensions.

Called the Besly Readepth, the instrument has a large, easy-to-read dial. Readepth saves time because one visual reading replaces the usual trial and error method. It saves money for it can be readily set to changed dimen-

sions and replaces many fixed and setup gages that become obsolete.

Readepth is accurately reset with the masters supplied. Constant accuracy from 0 to 3 inches is assured because resetting is required only when the contact rods are changed. Readepth can be used to check the depth of holes, slots, keyways and so on. It comes complete in a solid oak case. For more data circle 181 on Postpaid Card

Besly Readepth

★ modern machine shop ★

SELF-CONTAINED TEMPERATURE REGULATOR

Barber-Colman Co., 7611 Rock St., Rockford, Ill., announces a temperature regulator for proportional control of water, gas or low pressure steam. It is designed for all applications where a self-contained valve assembly may be particularly suited. Being a tight-closing, ruggedly constructed, self-contained unit, offers all the installation advantages of a self-contained controller, with the additional features of a clearly marked calibrated adjusting dial for precise temperature con-



T R U - T E X

CLOSE CENTER SLOTTING PERFORATORS

For piercing elongated slots on extremely close centers. Available as standards in 0.001" increments from 0.0312" by 0.125" to 0.250" by 1.250" in rectangle and oblong shapes. Styles and sizes other than standard can be made from your blue print. Write for Catalog. Exclusive territories open.

T R U - T E X I N C .

P. O. BOX 104

CINCINNATI 31, OHIO

For more data circle 555 on Postpaid Card

new shop equipment . . .



Barber-Colman Temperature Regulator

trol, a rugged electric industrial motor operator and armored capillary tubing.

Typical applications include package air conditioning units, hot water storage tanks, plating tank control, industrial process control and bottle washers.

For more data circle 182 on Postpaid Card

★ modern machine shop ★

GAGE BLOCK SET

Fonda Gage Co., 200 Henry St., Stamford, Conn., announces the development of a 23 piece rectangular gage block set in an ultra thin series made of tungsten carbide. This set provides the sizes from 0.010 up to 0.100 as a supplement to the standard larger sets. This is of particular interest for miniaturization problems.

There are nine blocks with 0.0001 increments from 0.0101 through 0.0109; nine blocks 0.001 increments

"ONE HOE FOR KALABO"

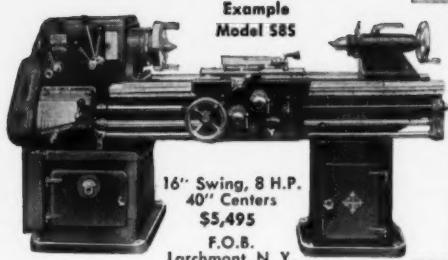
Sound and color movie film telling what machine tools are and what they do.

Culmination of several years of planning and production by the machine tool industry.

Designed primarily as a public education project.

Copy of film is available on free loan basis for showing to groups. Requests should be directed to Film Editor, Modern Machine Shop, 431 Main Street, Cincinnati 2, Ohio, and should specify the date of showing, the name of the organization requesting the film, the individual to whom the film should be addressed, address and telephone number.

MODERN MACHINE SHOP



16" Swing, 8 H.P.
40" Centers
\$5,495
F.O.B.
Larchmont, N.Y.

Weight 4800 lbs.
Spindle Speeds 18
Feeds & Threads 76
Spindle Bore 2½"

Flame Hardened Bedways Optional

**Superb
Swedish
Engineering
KOPING
LATHES**

**Realistically
Priced**

Heavy Duty

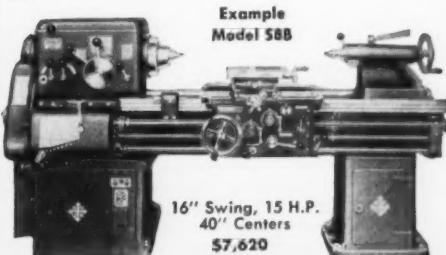
Large Spindle Bore

Swings From 16" to 60"

For years successful manufacturers have turned out better products with KOPING Machine Tools, which owe so much to the outstanding Swedish materials from which they are made. They know that the KOPING nameplate is not just another trademark, but is also a criterion of quality, top design and good service. KOPING has been making machine tools for more than 100 years. This continuity of service is our inspiration today as we build a bigger future for KOPING products.

Weight 6100 lbs.
Spindle Speeds 18
Feeds & Threads 271
Spindle Bore 2½"

Flame Hardened Bedways Standard



16" Swing, 15 H.P.
40" Centers
\$7,620
F.O.B.
Larchmont, N.Y.



MEKANISKA
VERKSTADS AB
KOPING • SWEDEN

Homestrand, inc.

Our representative in USA:
9 ADDISON STREET, LARCHMONT, NEW YORK



Another member of
the VOLVO Family

For more data circle 556 on Postpaid Card

new shop equipment . . .

from 0.011 through 0.019; four blocks, 0.010 increments from 0.010 through 0.040; and one, 0.01005.

In addition to the 0.010 series, a similar carbide set is available in the 0.020 series.

Even though the blocks are thin, the extremely hard and stiff tungsten carbide gives easy wringability over the entire gaging surface.

For more data circle 183 on Postpaid Card

★ modern machine shop ★

WHEEL GRINDS AND FINISHES IN ONE PASS

Specially designed to cut down-time in welding operations, a raised hub disc-wheel for portable grinders has been developed by Bay State Abrasive Products Co., Westboro, Mass. The two layer construction permits two different grinding angles, so that grinding and finishing operations can be accomplished without stopping to change wheels. When the wheel is held at an angle of 30 to 45 degrees to the surface of the work, it exposes the coarser grained layer for fast stock removal from weld bead. When held at a 10 to 20 degree angle, the second layer of the wheel is brought to bear and thus produces an excellent finish.

The stock removal layer is available in a single, standard grit specification, while the finishing layer is available in five different grits, each designed for finishing a particular type of metal from heavy steels through light stainless sheets to aluminum and copper. For more data circle 184 on Postpaid Card

★ modern machine shop ★

COMPARATOR AND INDICATOR CHECKER IS IMPROVED

The Go-Devil Monitor was originally developed as a dial indicator checker and self-mastering comparator for small parts that could be placed on the small diameter anvil for measuring.

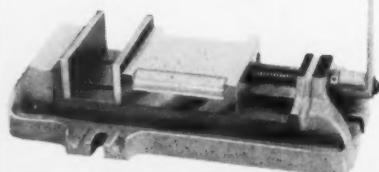
The manufacturer, Go-Devil Instrument Co., 624 Dutchess Turnpike, Poughkeepsie, N. Y., announces that this monitor is now equipped with a 2½ inch diameter work holding table, that increases the utility many times. The measuring capacity has been increased from 0.000 to 1.000 inch to 0.000 to 1.500 inch.

For more data circle 185 on Postpaid Card



The Go-Devil Monitor

HEAVY DUTY



Milling Machine Vise

Guaranteed for one year against breakage. Made from long wearing, oil resistant Meehanite casting (40,000 to 55,000 P.S.I.). Replaceable bronze nut. Coolant trough all around.

Write for folder giving complete specifications.

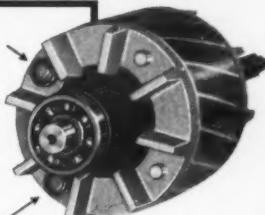
DUGAS MACHINE WORKS, INC.

620 YUMA COURT
DALLAS, TEXAS

For more data circle 557 on Postpaid Card

Choose The Balancing Features That Meet Your Workpiece Needs — EXACTLY on a Schenck

Completely efficient balancing is possible only on a balancing machine that can be adapted *exactly* to individual workpiece requirements. And this close correlation of method to part is possible only when you have a *complete* choice of various balancing methods. Schenck Balancing Machines offer you not just a wide variety of balancing methods, but the particular type of each method best suited to your component.



Motor armature with pre-cast bones. Balance corrected with washers (arrows)

Unbalance correction method	manually	semi-automatic	fully automatic					
Unbalance indicating system	componential		vectorial					
Number of correction planes	one	two	several					
Balancing Sensitivity (micro inches)	1,000	100	10	1	.1			
Balancing Speed (rpm)	100	1,000	10,000	100,000				
Drive method	belt	direct	air	own power				
Workpiece support	sleeve bearing	antifriction bearing	balancing fixture	own assembly				
Workpiece Weight (lbs.)	.01	.1	1	10	100	1,000	10,000	100,000
Workpiece Diameter (inches)	.1	1	10	100	1,000			
Rotating Axis		Horizontal	Vertical					



Depending on your operation, Schenck can provide you with:

A highly efficient single-purpose machine.

An extremely flexible universal model.

Let us study *your* balancing program and suggest a Schenck machine adapted specifically to *your* requirements.

Write For More Information

Model R-02 Schenck Balancer

COSA

—nationwide sales and service of precision machine tools—
—from bench lathes to boring mills.

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.
IN CANADA contact COSA CORPORATION OF CANADA, LTD., 1160 Lakeshore Road, Long Branch, Toronto 14, Ont.
For more data circle 558 on Postpaid Card

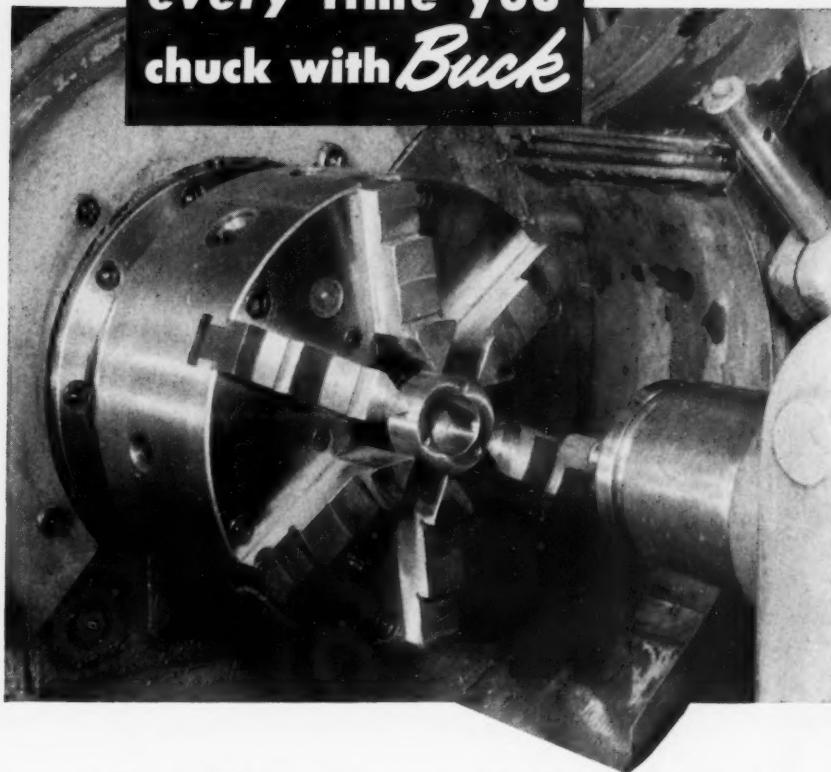
where to get it

where
to
get it

**Numbers shown are the page numbers
of advertisements and new equipment
write-ups which appear in this issue.**

- Abrasives, Grain, Cloth, Paper, Disc., etc.**, 21, 26, 28, 55, 58, 59, 82, 84, 192, 229
- Adapters**, 33, 135, 174
- Agitators**, 279
- Air Operated Equipment**
(Look for specific item)
- Alloys, Inside Front Cover**, 9, 24, 32, 66, 95, 148, 184, 245
- Amplifiers**, 60, 221
- Angle Irons**, 250
- Arbors**, 33
- Automated Equipment**
(Look for specific item)
- Balancing Machines**, 27, 269
- Balancing Ways**, 86
- Bar Stock**, 184
- Bars, Aluminum**, 85
- Bars, Bottoming**, 204
- Bearings, Bronze**, 85
- Bearings, Motor**, 85
- Bearings, Radial**, 264
- Bearings, Thrust**, 85
- Benches, Work**, 199
- Bending Devices**, 92b,c,d, 172
- Bending Machines**, 53, 92b,c,d, 207, 208, 230
- Bins**, 199
- Blades, Cutting-Off**, 9, 17, 82
- Blades, Shear**, 17, 25
- Blocks, Step**, 178
- Bolts**, 169, 178
- Boosters**, 161
- Boring Bars**, 50, 54, 135, 234
- Boring Heads**, 185, 245, 257
- Boring Machines**, 40, 218
- Boring Mills**, 18, 269
- Boring Units**, 70
- Boxes, Stacking**, 199
- Brackets**, Front Cover, 12, 14, 16, 157
- Brakes, Air**, 216
- Brakes, Press and Bending**, 44, 45, 218, 223
- Broaches**, 38, 56
- Broaching Kits**, 56
- Bronze Bars**, 85
- Brushes**, 67
- Brushes, Polishing**, 202
- Brushing Machines**, 67
- Buffers, Bench and Pedestal**, 146
- Burners**, 163
- Burs**, 95
- Bushings, Brass, Bronze, etc.**, 85
- Bushings, Drill Jig**, 50, 79, 238
- Bushings, Tap**, 229
- Calipers**, 175, 251
- Cam Making Machines**, 251
- Cams**, 169, 229, 249, 251
- Carbides**, Inside Front Cover, 9, 28, 232
- Cartridges**, 212
- Center Finders**, 240
- Centers, Bench**, 22
- Centers, Lathe, Planer, Miller, etc.**, 197, 225, 228, 262
- Checking Instruments and Gages**, 239
- Chucks, Boring**, 50
- Chucks, Collet**, 50
- Chucks, Lathe**, 182
- Chucks, Magnetic**, 182
- Chucks, Power**, 271
- Chucks, Scroll**, 271
- Chucks, Tap**, 246
- Chucks, Universal**, 182
- Chutes, Gravity**, 262
- Circulators**, 279
- Clamps**, 33, 157, 178, 196, 217, 275
- Clinching Machines**, 87
- Clutches**, 216
- Coatings, Protective**, 264
- Coil Handling Equipment**, 180, 217
- Collars**, 200
- Collet Closers**, 227
- Comparators**, 157, 171, 215, 268
- Compasses**, 244
- Control Systems**, 68

**YOU make money
every time you
chuck with Buck**



1. You get *dead true* precision chucking single parts—.0005" precision on duplicate parts. (Conventional chucks are only accurate to .003" when new.)

2. You save costly machinists' time. Takes but a minute to indicate and adjust a Buck. No fooling around with shims.

Makers of Scroll, Power,
Dust Proof, Independent
Chucks.

3. The Buck Ajust-Tru® principle helps compensate for spindle run-out, compensates for chuck wear—greatly lengthens chuck life.

Buck Ajust-Tru 3- and 6-jaw chucks cost no more than conventional chucks. Send for catalog—see for yourself why "It pays to chuck with Buck."

BUCK TOOL COMPANY

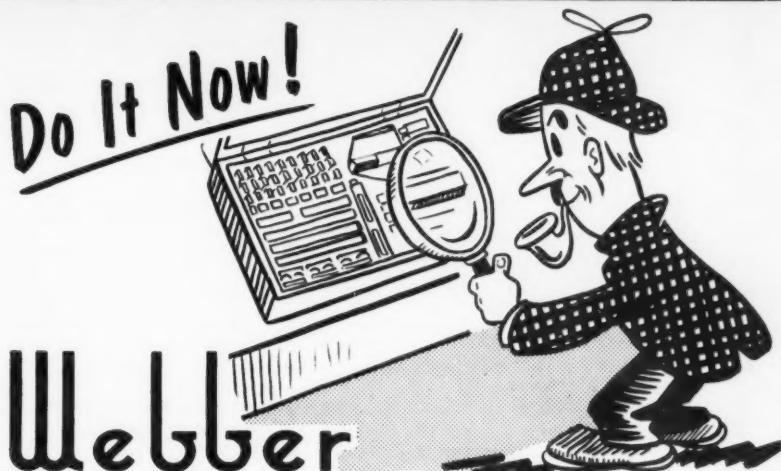
714 SCHIPPERS LANE • KALAMAZOO, MICH.

For more data circle 559 on Postpaid Card

Controlling Devices, 206, 226
Coolant Blender Dispenser, 253
Coolant Units and Systems,
 196, 247, 255, 259
Counterbores, 38, 244
Countersinks, 17, 172, 222
Cranes, 205
Cut-Off Machines, 69, 73, 207, 219, 241
Cut-Off Wheels, 73, 82
Cutters, Boring, 38, 212
Cutters, Engraving, 199
Cutters, Finishing, 221
Cutters, Hole, 231
Cutters, Inserted Blade and Tooth,
 88, 139, 235
Cutters, Keyway, 202
Cutters, Milling, 9, 38, 220, 235, 255, 281
Cutters, Port Contour, 139
Cylinders, Hydraulic and Pneumatic,
 87, 97
Demagnetizers, 182
Diamond Wheels, 157
Diamonds and Diamond Tools,
 157, 253
Die Sets, 236, 241
Dies, Punching or Forming, Inside
 Front Cover, 51, 71, 92, 173, 223
Dividing Heads, 182
Drawers, Storage, 200
Dressers, Grinding Wheel, 28, 157, 253
Dressing Fixtures, Grinding Wheel,
 33, 224, 249, 275
Drill Heads, Front Cover, 12, 14, 16, 81,
 222, 231
Drilling Attachments, 248, 256
Drilling Machines, Multiple Spindle,
 190
Drilling Machines, Radial, 20, 40, 133,
 137
Drilling Machines, Sensitive, 40
Drilling Machines, Vertical, 40
Drilling, Tapping and Threading
 Machines, Combination, 48
Drilling and Tapping Units,
 Combination, Front Cover, 12, 14, 16
Drilling Units, Front Cover, 12, 14, 16,
 226, 254
Drills, Center, Core, Twist, etc., 17,
 139, 172, 174, 215, 227, 242, 250
Drills, Portable Pneumatic, 166
Drivers, Tap, 38
Dust Control Equipment, 5, 65, 177,
 181, 225
Dynamometers, 60
Electrical Discharge Machines, 258
End Mills, 240
Engraving Machines, 92a, 199
Extensions, 261
Facing Heads, 185, 229
Files, 95, 234
Files, Rotary, 173
Films, 266
Filters, 244
Fittings, Water Line, 257
Flexible Shaft Equipment, Front
 Cover, 12, 14, 16, 26, 81
Forging Machines, 25, 247
Forgings, 184
Forming Machines, 191, 223
Furnaces, Heat Treating, 78, 163, 235,
 259
Gage Accessories, 89, 157, 261
Gage Blocks, 60, 266, 273
Gages, 46, 47, 60, 64, 89, 171, 223, 228,
 251
Gear Burring Machines, 192
Gear Cutting Machines, 152, 153
Generators, 255
Grinders, Bench, 146
Grinders, Center Type, 10, 11
Grinders, Centerless, 10, 11
Grinders, Chucking, 10, 11
Grinders, Crankpin, 188
Grinders, Cutter and Tool, 92a, 155,
 199, 208
Grinders, Cylindrical, 21, 55, 58, 59,
 187
Grinders, Die and Mold, 166, 237
Grinders, Disc, 146
Grinders, Drill, Front Cover, 12, 14, 16,
 155
Grinders, Hand, Front Cover, 12, 14,
 16
Grinders, Hydraulic, 76
Grinders, Jig, 40
Grinders, Pedestal, 146
Grinders, Portable Electric, 26
Grinders, Portable Pneumatic,
 166, 221, 237
Grinders, Roll, 10, 11
Grinders, Surface, 7, 25, 52, 65, 90, 263
Grinders, Tap, 167
Grinders, Thread, 76
Grinders, Tool Post, Front Cover, 12,
 14, 16
Grinders, Universal, 76
Grinders, Valve, 26
Grinders, Vertical Spindle, 49
Grinding Compounds, 229
Grinding Fixtures and Attachments,
 10, 11, 187, 260
Grinding and Polishing Machines,
 Combination, 25

**Have you had your gage blocks calibrated
to the new International Inch?**

Do It Now!



Webber

**INSPECTION SERVICE
is prompt and inexpensive**

For example, inspection of an 84-block standard steel set (B, A or A+ accuracy) costs only **\$18** . . . includes a certificate showing each block's deviation, if any, from the new International Inch . . . also includes removal of burrs and nicks which impair accuracy. If you wish, Webber will replace all blocks worn or damaged beyond repair. Your blocks are returned within a very few days after receipt.

Catch worn gage blocks before trouble starts! Send for complete information and price list today!

Webber GAGE COMPANY 12899 TRISKETT ROAD
CLEVELAND 11, OHIO

LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

Grinding Wheels, 21, 55, 58, 59, 90, 268
Guns, Air, 201

Hammer Molds, 224
Hammers, Hand, 95, 148, 224
Hand Tools, Power
 (Look for specific item)
Handles, Hammer, 224
Handwheels, 233, 248
Hardness Testing Devices, 60, 183, 264
Hinges, 246
Hobs, 64
Holders, Floating, 134, 145
Holders, Stylus, 83
Holders, Tap, 145
Holders, Tool, 9, 50, 80, 145, 202, 234
Holders, Work, 250
Honing Machines, 61, 169, 262
Hose Assemblies, Coolant, 249
Hydraulic Equipment
 (Look for specific item)

Indicators, 46, 47, 60, 235
Inhibitors, 124, 125
Inserting Machines, 238
Interferometers, 60

Jig and Fixture Components, 50, 178
Jig Borers, 40, 77, 215
Jigs and Fixtures, 241

Keys, Fixture, 178
Keys, Machine, 197, 231
Keys, Woodruff, 197, 231
Keyway Cutting Machines, 238
Knives, 17, 25
Knobs, Hand, 178, 233

Lapping Compounds, 229
Lapping Machines, 254
Lathes, Automatic, 27, 258
Lathes, Bench, 195, 269
Lathes, Engine and Toolroom, 18, 34,
 35, 51, 195, 207, 220, 267, Inside
 Back Cover
Lathes, Tracer, 133, Inside Back Cover
Lathes, Turret, 6, 27
Layout Materials, 199, 201
Levers, 233
Lubricants, 159

Machining Units, Portable, Front
 Cover, 12, 14, 16
Magnifiers, 165, 171
Marking Devices, 91, 170, 203, 216,
 221, 235, 243
Micrometers, 60, 171, 265

Microscopes, 19, 171
Milling Attachments, 15, 179, 248
Milling Machines, Horizontal,
 15, 29, 62, 194
Milling Machines, Universal, 18
Milling Machines, Vertical 29
Mills, Face, 38
Mills, Hollow, 201
Mitre Units, 232
Motors, Air, 57
Mounted Wheels and Points, 282
Mountings, Machine, 168

Name Plates, 92a
Nibblers, 71, 173
Notching Units, 160
Nuts, 178
Nuts, T, 178

Oils, Cutting, 13

Parallels, 251
Parts, Machine Tool, Production,
 Aircraft, etc., 85, 231
Penetrators, Diamond, 183
Perforating Units, 265
Pins, Dowel, Taper, etc., 197, 231, 248
Plates, Angle, 179
Pliers, 217
Polishers, Portable Electric, 26
Positioning Fixtures and Devices, 230
Power Units, Hydraulic and
 Pneumatic, 97
Presses, Air, 62, 223
Presses, Arbor, 62, 163
Presses, Foot, 62
Presses, Hydraulic, 36, 163, 220, 223
Presses, Power, 37, 51, 62, 164, 167,
 186, 223
Presses, Punch, 180, 192, 211
Presses, Turret Punch, 39
Projectors, Profile, 171
Pulleys, 200
Pumps, Coolant and Lubricant, 279
Pumps, Molten Metal, 279
Punch Press Stopping Devices, 246
Punches, 71, 173, 251
Punching Units, 219, 239

Quills, Front Cover, 12, 14, 16

Racks, Machine, 197, 231
Reamers, 17, 30, 38, 209
Rectifiers, 182, 242
Reels, 233

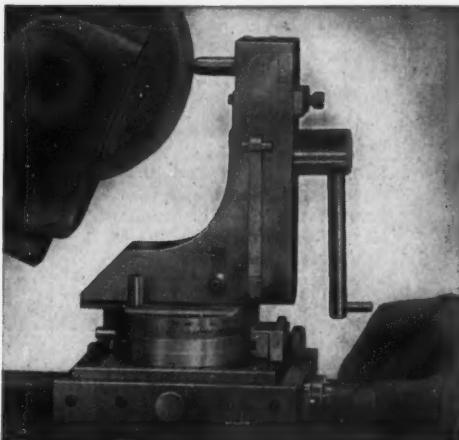
Tough Grinding Wheel Forms Dressed Easy as A, B, C

eliminate elaborate set-ups
and operations

.0001" ACCURACY

Fluidmotion
WHEEL DRESSERS

dress two angles tangent to a radius
in one continuous motion



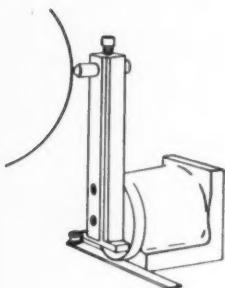
With the unique "Fluidmotion" Dresser, you can dress two angles tangent to a radius — using one handle in one continuous motion. Operation is so fast and simple that beginners can use them.

Adaptable to all type cylindrical and surface grinders.

A. Obtain micrometer reading; add required convex radius or subtract required concave radius.

B. Loosen jibs with wrench and "mike" over lower pins to reading obtained above.

C. Tighten jib. Set stops for two angles. Ready for action.



Also available: "FORM MASTER" Dresser, capable of dressing any radii up to 12" convex, up to 15" concave.

See your industrial distributor or write for free literature.

WHEEL DRESSERS J & S
TOOL CO., INC. JAW CLAMPS • PRECISION VISES • DOWN-HOLDING DEVICES

CLAMPCUT • THE NAME •

J & S TOOL CO., INC.

871 DORSA AVE.
LIVINGSTON, NEW JERSEY

For more data circle 560 on Postpaid Card

July, 1959

modern machine shop 275

Refractories, 21, 55, 58, 59
Regulators, 265
Rings, Retaining, 264
Riveting Machines, 87, 257
Routers, 215

Sanders, Portable Electric, 26, 198
Sanders, Portable Pneumatic, 247
Saw Blades, Band, 31, 95, 148
Saw Blades, Circular, 17
Saw Blades, Hack, 31, 95, 148
Saw Blades, Hole, 148
Saw Blades, Power, 148
Saw Blades, Slitting, 17
Saw Sharpening Machines, 224, 256
Sawing and Filing Machines,
Combination, 8, 237
Sawing Machines, Band, 31, 62, 75,
206, 258
Sawing Machines, Hack, 31, 182, 252
Saws, Portable Electric, 26
Scrapers, Power and Hand, 86
Screw Drivers, Portable Electric, 26
Screw Drivers, Portable Pneumatic, 26
Screw Machines, Automatic, 190
Screw Machines, Hand, 210
Screws, Cap, Set, Socket, and
Machine, 169, 178, Back Cover
Screws, Transfer, 233, 244
Segments, Grinding, 90
Services: Milling, Grinding, Lapping,
Rebuilding, Repairing, Business,
etc., 42, 43, 157, 165, 169, 171, 173,
211, 224, 229, 231, 238, 240, 249, 251,
254, 273
Shapers, 44, 45, 63, 195
Sharpening Machines, 209
Shearing Machines, 20, 25, 44, 45
Shearing, Punching, and Coping
Machines, Combination, 210
Shears, Hand, 242
Shears, Squaring, 62
Sheet Fanners, Magnetic, 260
Shelving, 199
Shims, 240
Sine Bar Fixtures, 33, 275
Sleeves, 227
Special Machinery, 51
Spindles: Grinding, Boring, Milling,
etc., 134, 219, 225, 284
Spotfacers, 38, 139
Spring Winders, 149
Springs, 162
Steel, Die, 24
Steel, Stainless, 66
Steel Stock, Ground Flat, 95, 148
Steel, Tool, 32, 245

Straightening Machines, 263
Stud Sets, 178
Studs, 169, 178
Superfinishing Machines, 27
Switches, 182

Tables, Drill, 203
Tables, Elevating, 147, 173
Tables, Rotary and Index, 74, 92a, 165,
179, 203, 214

Tables, Universal, 236
Tap Guides, 246
Tapes, Pressure Sensitive, 21, 55, 58,
59

Tapes, Sealing, 194
Tappers, Automatic, 191, 231
Tappers, Hand, 169
Tapping Attachments, 256
Tapping Heads, 81, 256
Tapping Machines, 72
Tapping Units, Front Cover, 12, 14, 16
Taps, 64, 81
Testers, Tensile, 246
Threading Equipment, 4
Tool Bits, 9
Tool Blanks, 9
Tools, Alloy-Tipped, 9
Tools, Balancing, 22
Tools, Boring, 9, 30
Tools, Burnishing, 131
Tools, Carbide, Inside Front Cover, 9,
17, 81, 173, 202, 213, 220, 233, 234,
235, 240

Tools, Chamfering, 222
Tools, Cutting-Off, 9
Tools, Deburring, 23, 222
Tools, Facing, 9
Tools, Form, 38
Tools, Reciprocating, 250
Tools, Relieving, 197
Tools, Threading, 41
Tools, Turning, 9
Tracers, Lathe, 283
Trucks, 199
Tubing, 227
Turrets, Lathe, Tool Post, Bed and
Tailstock, 205

Valves, 97, 277
Vises, Bench and Machine, 33, 50,
179, 182, 198, 268, 275

Washers, 178
Washing Machines, Industrial, 242
Wear Parts, Inside Front Cover
Wrenches, 99, 167, 214
Wrenches, Impact, 26

FULFLO

PISTON-TYPE OIL
RELIEF HYDRAULIC
BY-PASS VALVES
FOR O. E. M. OR
REPLACEMENT

Best Buy because



QUICK DELIVERY

Fulflo stocking policy and practice permits quick shipment from stock of most standard types. Shipment is usually made within 24 hours.



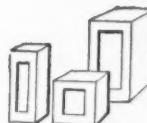
TECHNICAL SERVICE

Fulflo engineers are ready and able to help you with any valve problem. Modified standard or special valves can be provided for any need.



WIDE RANGE OF TYPES AND SIZES

- Standard and flanged models
- Just 6 springs for pressures to 500#
- Wide range of brass, cast iron or steel bodies... brass, steel or stainless pistons
- Pipe sizes to 3"
- SPECIALS to your requirements



FREE, completely NEW
CATALOG . . . just off the press!

THE FULFLO SPECIALTIES CO., INC.
416 Fancy Ave.—Blanchester, Ohio



For more data circle 561 on Postpaid Card

July, 1959

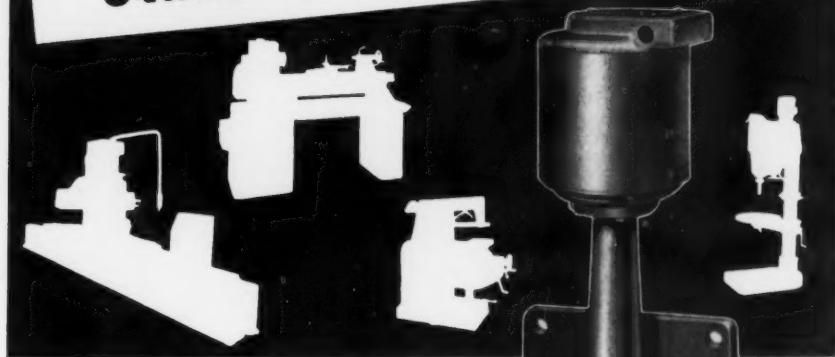
modern machine shop 277

index to advertisements

*For listing of products offered by
these advertisers please consult
the "Where To Get It" Section.*

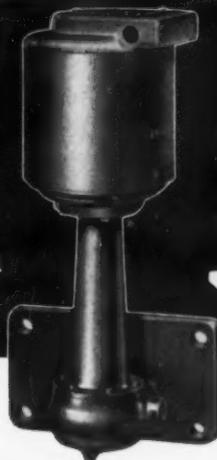
A.C.M.	157	Bay Products Div.,	
A.K. Tool Co., Inc.	231	American Metal Wks., Inc.	199
Aaron Mchry. Co., Inc.	20, 29	Behr-Manning, Div. of Norton Co.	55
Abrading Systems Co.	254	Bellows Co.	57
Ace Drill Bushing Co.	79	Benchmark Mfg. Co.	180
Acme Tool Corp.	250	Bentley Industrial Corp.	187
Acromark Co.	170	Blanchard Machine Co.	90
Adamas Carbide Corp.	Second Cover	Bliss Co., E. W., Die Supply Div.	241
Adjustable Clamp Co.	157	Boggis & Co., H. P.	167
Aetna Mfg. Co.	255	Bokum Tool Co.	80
Aget Mfg. Co.	177	Branch Mfg. Co.	246
Airetool Mfg. Co.	166	Bremil Mfg. Co.	242
Airway Pump & Equipment Co.	201	Brightboy Industrial Div.	84
Albertson & Co., Inc.	26	Buck Tool Co.	271
Alina Corp.	175	Bunting Brass & Bronze Co.	85
Allegheny Ludlum Steel Corp.	32	Byco Industries	229
Allison-Campbell Div.,		Capewell Mfg. Co.	148
American Chain & Cable Co., Inc.	73, 82	Carlton Machine Tool Co.	137
Allstate Diamond Products, Inc.	157	Chicago Mfg. & Dist. Co.	159
American Chain & Cable Co., Inc.,		Chicago Tool & Engr. Co.	179
Allison-Campbell Div.	73, 82	Cincinnati Electrical Tool Co.	284
Wilson Mechanical Instrument Div.	71, 183	Cincinnati Milling Machine Co.	10, 11
American Sip Corp.	77	Cincinnati Shaper Co.	44, 45
American Tool Wks. Co.	133	Circular Tool Co.	17
Anderson Bros. Mfg. Co.	86	Clark Co., Robt. H.	215, 221, 231, 244
Anton Machine Wks.	165, 211	Clearing Div., U. S. Industries, Inc.	51, 164
Armco Steel Corp.	66	Clover Mfg. Co.	229
Armstrong-Blum Mfg. Co.	31	Cogsdill Tool Products, Inc.	23
Armstrong Bros. Tool Co.	99	Commander Mfg. Co.	256
Austin Industrial Corp.	76	Continental Tool Wks.,	
Auto Moulding & Mfg. Co.	246	Div. of Ex-Cell-O Corp.	38, 54
Avey Div., Match &		Cook's Lead Hammer Service	224
Merryweather Mchry. Co.	74	Cosa Corp.	269
B & W Precision Products Co.	174	Criterion Machine Wks.	83
Backus Machine Wks.	207	DeVlieg Microbore,	
Barber-Colman Co.	42, 43	Div. of DeVlieg Machine Co.	135
Barnes Drill Co.	61	Dixie Tool Industries, Inc.	240
Barry Controls, Inc.	168	Dreis & Krump Mfg. Co.	223
Bausch & Lomb Optical Co.	19		

Standardize Your Pumps



Ruthman GUSHER COOLANT PUMPS

Model
5 P3



Model
11025



Model
5 P3

Write for our complete catalog today!

Give you PRECISION at a PRICE

Yes, Ruthman Gusher Coolant Pumps are precision built of the very finest materials, yet their initial price is moderate, maintenance cost practically nothing. It will pay you to standardize the pumping on all your metal cutting machinery with Ruthman Gusher Coolant Pumps.

FROM THE SMALLEST TO THE LARGEST,
Flange or Immersed Type
THERE'S A GUSHER FOR EVERY NEED

You'll find a full range of coolant pumps
—from 1/30 to 7½ HP. Write and tell
us what you need, we'll be glad to quote
to your specifications—Better still call us
at MA 1-5462.

THE **Ruthman** MACHINERY CO.

1817 READING ROAD

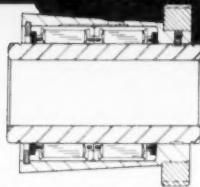
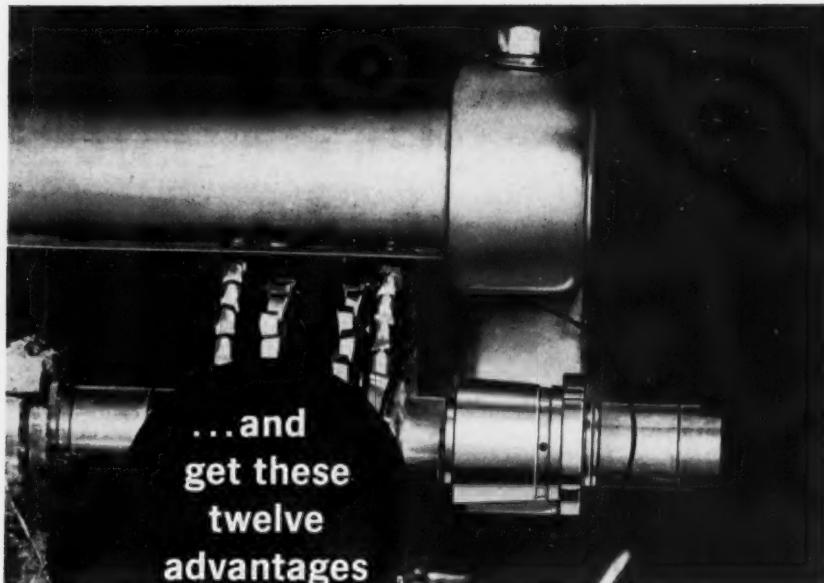
For more data circle 562 on Postpaid Card

CINCINNATI 2, OHIO

- COOLANT PUMPS
- CIRCULATORS • AGITATORS
- MOLTEN METAL PUMPS

Dugas Machine Wks., Inc.	268
duMont Corp.	56
Dumore Co.	First Cover, 12, 14, 16
Dykem Co.	201
 Eastern Centerless Grinding Co.	240
Eclipse Counterbore Co.	139
Edroy Products Co.	165
Eisler Engr. Co., Inc.	249
Empire Tool Co.	145
Enco Mfg. Co.	205
Ex-Cell-O Corp.	38, 54
 Famco Machine Co.	62
Federal Products Corp.	46, 47
Fellows Gear Shaper Co.	152, 153
Flynn Mfg. Co.	257
Fosdick Machine Tool Co.	40
Foster Supplies Co.	89
Fulflo Specialties Co., Inc.	277
 Gallmeyer & Livingston Co.	7
Gatco Rotary Bushing Co.	238
Gisholt Machine Co.	27
Grant Mfg. & Machine Co.	257
Graymills Corp.	242
Greaves Machine Tool Co.	15
Green Instrument Co.	92a
Greenerd Arbor Presses	163
Greenlee Bros. & Co.	70
 H & R Supply Co.	263
Hamilton Tool Co.	147
Hammond Mchry. Builders, Inc.	5
Hannifin Co., Div. of Parker-Hannifin Corp.	37
Hanson-Whitney Co.	64
Heimann Mfg. Co.	244
Hill Acme Co.	25
Himoff Machine Co., Inc.	229
Holmes Gage & Development Corp.	221
Holo-Krome Screw Corp.	Fourth Cover
Homestrand, Inc.	267
Hones, Inc., Chas. A.	163
Houston Grinding & Mfg. Co., Inc.	197
 Ideal Industries, Inc.	225
Index Industrial Corp.	18
Ingersoll Milling Machine Co.	88
 J & S Tool Co., Inc.	33, 275
Jarvis Corp.	81
Jean Mfg. Co.	249
Johansson Gage Co., C. E.	60
 Johnson Gas Appliance Co.	259
Johnson Machine & Press Corp.	167
 Kapp Engineers, H.	172
Kaufman Mfg. Co.	72
Kidde Precision Tool Corp.	169, 238
 L-W Chuck Co.	182
Landis Machine Co.	4
Lapeer Mfg. Co.	217
Lassy Tool Co.	169, 250
Latrobe Steel Co.	24
LeBlond Machine Tool Co.	34, 35
Lilly & Co., Eli	124, 125
Linley Bros. Co.	215
Lockformer Co.	75
Lodge & Shipley Co.	Third Cover
Logansport Machine Co., Inc.	97
Lowell Wrench Co.	167
Lucifer Furnaces, Inc.	235
 M & M Tool & Mfg. Co.	260
Machine Products Corp.	233
Madison-Faessler Tool Co.	131
Madison Industries, Inc.	30
Mahr Gage Co.	157
Mattison Machine Works	52
McDonough Mfg. Co.	155
Midwest Tool & Engr. Co.	173
Miller Fluid Power Div., Flick-Reedy Corp.	161
Modern Machine Tool Co.	69
Mossberg, Inc.	227
Mummert-Dixon Co.	229
 National Acme Co.	41
National-Detroit, Inc.	247
Neise, Karl A.	185, 245, 251
New Method Steel Stamps, Inc.	243
Niagara Cutter Div.	235
Nicholson File Co.	95
Nielsen, Inc.	262
Nielsen Tool & Die Co.	233
Nilson Machine Co., A. H.	233
Noble & Westbrook Mfg. Co.	91
Nobur Mfg. Co.	222
Northwestern Tools, Inc.	178
Norton Co.	21, 28, 58, 59
Numberall Stamp & Tool Co.	203
Nu-Tangs, Inc.	171
 Oliver Instrument Co.	8
O'Neil-Irwin Mfg. Co.	92b,c,d
Osborn Mfg. Co.	67
Ottemiller Co., Wm. H.	169
 Pannier Corp.	221
Parker-Hannifin Corp.	37

Replace the bronze bushing in your
MILLING MACHINE ARBOR SUPPORT
with a **Sonnet ROLLER BEARING**



- Faster speeds and feeds
- Maximum rigidity
- No chatter
- No bearing heating
- No bearing seizure
- No twisted arbors
- Longer cutter life
- Utilizes machine's lubrication system
- Increased production
- Better finishes
- Less maintenance
- Faster set-ups

For more data circle 563 on Postpaid Card

Installed in minutes without machine rework. Requires no extra space; no adjustments. Extra sets of bushings provided to accommodate different size arbors. Permits full range of speeds and feeds of late model milling machines. Carbide cutters can be fully utilized.

Write for catalog.

SONNET

TOOL & MFG. CO.

580 North Prairie Avenue
Hawthorne, California

Peaslee Metal Products Co.	248
Pedrick Tool & Machine Co.	53
Pemco Perforators Co.	173
Perkins Machine & Gear Co.	149
Porter Machine Co.	173
Precision Gage & Tool Co.	240
Preis Engraving Machine Co., H. P.	199
Queen City Machine Tool Co.	146
Raymond Mfg. Co.	162
Reading Machine Co.	238
Reich Mfg. Co., J. R.	235
Reid Tool Supply Co.	248
Reliance Tool & Mfg. Co.	224
Retro Developments, Ltd.	283
Richards Co., J. A.	172
Rico Tool Co.	233
Rockford Machine Tool Co.	63
Rodgers Hydraulic, Inc.	36
Rota File Corp.	173
Rowbottom Machine Co.	251
Ruthman Mchry. Co.	279
Sales Service Machine Tool Co.	252
Sanford Mfg. Corp.	65
Savage Co., W. J.	173
Scherr Co., Inc., Geo.	171
Schmidt, Inc., Geo. T.	235
Schupack Supply Co.	282
Seibert & Sons, Inc.	134
Sentry Co.	78
Service Machine Co.	186
Sheldon Machine Co., Inc.	195
Silber Products, Inc.	197
Snow Mfg. Co.	48
Sonnet Tool & Mfg. Co.	281
Spellman Co., R. L.	251
Springfield Machine Tool Co.	49
Standard Electrical Tool Co.	219
Standard Horse Nail Corp.	231
Standard Steel Specialty Co.	197
Stevens Co., John B.	165
Sturdy Broaching Service, Inc.	227
Sun Oil Co.	13
Sundstrand Corp.	22
Tamms Industries Co.	199
Thriftmaster Products Corp.	231
Titan Tool Supply Co.	244
Tomkins-Johnson Co.	87
Torit Mfg. Co.	181
True-Trace Sales Corp.	68
Tru-Tex, Inc.	265
Twentieth Century Mfg. Co.	209
Universal Engr. Co.	50
Universal Metal Hose Co.	249
Vapor Blast Mfg. Co.	169
Vascoloy-Ramet Corp.	9
Vermont Flexible Tubing Co.	227
Victor Mchry. Exchange, Inc.	253
Vogel Tool & Die Corp.	160

144 ABRASIVE WHEELS & POINTS

Brand New
Perfect First
Quality
Mounted on $\frac{1}{4}$ "
Steel Mandrels

ONLY
\$28.50

Postpaid
Imported
in U.S.A.



List value
\$93.60
Save
up to
\$65.10

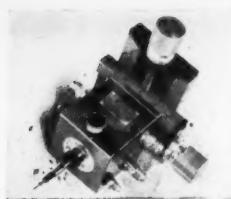
**72 Abrasive Wheels & Points on
1/4 inch steel mandrels \$26.50**
Complete In Handy, Sturdy Container At No Extra Cost
If after 10 days you are not fully convinced that this
is the greatest wheel and point value in the industry,
return the set at no cost or obligation on your part
Illustrated Free Catalog on Request

SCHUPACK SUPPLY CO., DEPT. MS-14
7331 Cottage Grove Ave.
Chicago 19, Illinois
For more data circle 564 on Postpaid Card

282 modern machine shop

Wade Tool Co.	6
Walton Co.	261
Wardwell Mfg. Co.	224
Watts Bros. Tool Wks.	242
Webber Gage Co.	273
Wells Mfg. Corp.	239
Wheelock, Lovejoy & Co.	184
Whistler & Sons, Inc., S. B.	92
Wiedemann Machine Co.	39
Willey's Carbide Tool Co.	213
Wilson Air Collet Closer, Inc.	227
Wilson, Inc., T. C.	237
Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc.	71, 183
Wirth & Son, Inc., Carl	201

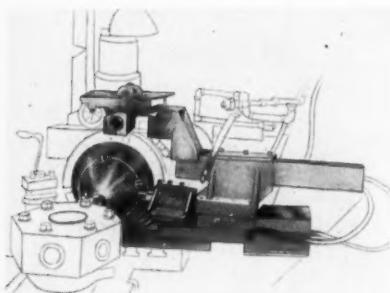
July, 1959



"a velvet touch and a tiger's response"

All MIMIK® Tracers—

- Have universal positioning.
- Can fit any machine.
- Require only minutes to install.
- Involve no machine tool conversion.
- Are easy to set up.
- Can use templates or round masters.
- Fully guaranteed.
- Have unequalled accuracy.
- Have micrometer settings on X & Y.
- Interchangeable between machines.



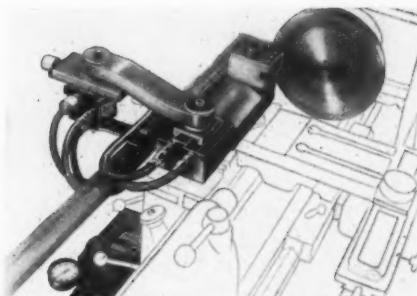
MIMIK® can do all these things because its unique valve is so incredibly versatile there is practically no limit to the way it can be applied in a Tracing System.

Your MIMIK® Tracer will pay for itself in months, not years, and not only will slash costs, but will enable your existing machine tools to do work far beyond their present capacity.

**THE RETOR®
MIMIK®
HYDRAULIC
TRACER**

For more data circle 565 on Postpaid Card

July, 1959



▲ "9000" Series for Engine Lathes:

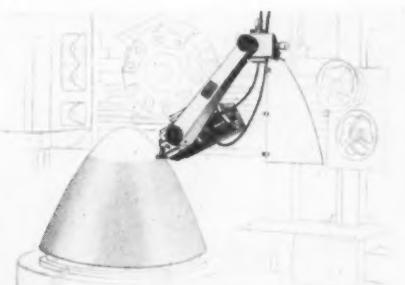
- Six standard models to fit any lathe.
- Replaces existing compound.

“5000” Series for Turret Lathes:

- Rear mounted on ram type.

◀ “3000” Series for VTL’s:

- No machine tool conversion.
- Fits into ram or turret like conventional toolholder or replaces tool post on side head.



U.S. LICENSED MANUFACTURERS.

East Coast—Farmington Mfg. Co., Farmington, Conn.
Central—Barisch Tool Corp., 6570 N. Harlem, Chicago.

West Coast—Allied Pacific Mfg. Co., 17825 S. Santa Fe Ave., Los Angeles.

Sales Representatives in all major U.S. and Canadian cities.

CANADA • RETOR DEVELOPMENTS • GALT, ONTARIO

Presenting Industry's

BIG SHOW

OF SUPER PRECISION SPINDLES

The Complete Line ★ The Diversified Line ★ Job Tested ★ Job Proven



**SPINDLES
For Grinding,
Milling, Drilling,
Boring, Routing And
ELECTROLYTIC
METAL REMOVAL**

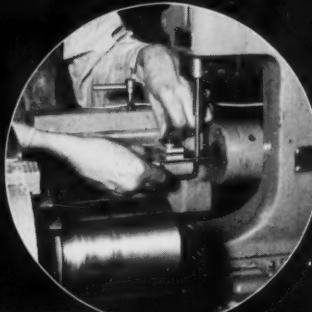
Write
Today
for our NEW
Spindle Catalog

CINCINNATI

The Cincinnati Electrical Tool Co.

330 Mt. Hope Ave., Cincinnati 4, Ohio

For more data circle 566 on Postpaid Card



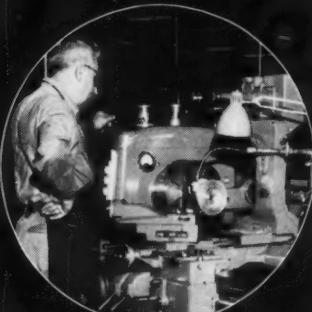
time

saved

reports
Reaction Motors Division
Thiokol Chemical Corporation

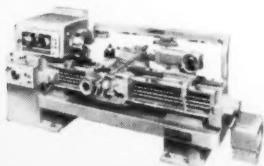
LATHE: 16" Powerturn
90° COPYMATIC 54" centers
CUSTOMER: Reaction Motors
 Division of Thiokol Chemical Corp.
ADDRESS: Denville, New Jersey
DISTRIBUTOR:
 Harrington-Wilson-Daum Corp.,
 Mt. Vernon, New York
WORKPIECE:
 Rocket Motor Nozzle
MATERIAL: 347 stainless steel
CUTTING TOOLS: High speed steel
OPERATION:
 Contour turning and boring
TIME:
 Machining 6 hours
 Handling 1 hour
 Floor-to-floor 7 hours
RESULTS: 63% savings in time
DATA BY:
 P. Meccarelli, Gen. Foreman

Inserting flat template in Copymatic prior to machining blank already chucked in lathe.



Contour turning the exterior of the rocket motor nozzle. Note finished pieces on headstock.

by this Lodge & Shipley Powerturn Copymatic Lathe



More than ever before, your LODGE-ical choice . . .

Reaction Motors Division of Thiokol Chemical Corp., Denville, N. J., plays an important part in America's rocket programs. In contour turning and boring a typical reaction motor nozzle, a Lodge & Shipley POWERTURN COPYMATIC Lathe cuts 12 hours from the previous time, completing the job in just 7 hours, floor-to-floor.

Whether you're machining new alloys or old stand-by metals, you'll appreciate the strength, rigidity, extra power, speed and accuracy of Lodge & Shipley Lathes. Investigate the time and money-saving possibilities of Lodge & Shipley COPYMATIC Lathes with 45° or 90° tracer slides. Contact your Lodge & Shipley representative or write for detailed literature:

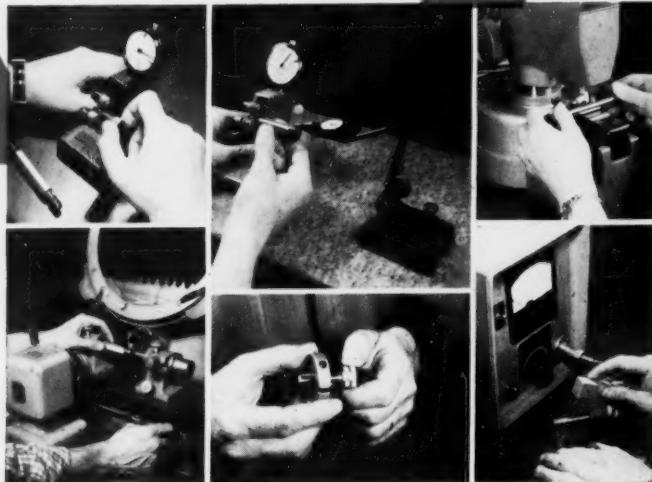
The Lodge & Shipley Co., 3058 Colerain Ave., Cincinnati 25, Ohio

Lodge & Shipley

**TO PRODUCE QUALITY
SOCKET SCREWS
THE H-K WAY—**

**PRECISION
GAUGES
IN SKILLED HANDS
CHECK TOLERANCES AT
EVERY PRODUCTION STAGE**

Rigid quality control tests subject H-K products to critical inspection... from the original wire stock to the finished socket screw. Accurate gauging is only one of the many steps taken by H-K to guarantee unfailing performance.



For the finest in socket screw products... for unmatched SAME-DAY SERVICE—the name to remember is Holo-Krome. Write for free catalog and technical information.

**HOLO-KROME
SOCKET SCREWS**



THE HOLO-KROME SCREW CORPORATION • HARTFORD 10, CONN. SOLD ONLY THROUGH AUTHORIZED HOLO-KROME DISTRIBUTORS

For more data circle 304 on Postpaid Card

